ARABIC TYPE CLASSIFICATION SYSTEM

QUALITATIVE CLASSIFICATION OF HISTORIC ARABIC WRITING SCRIPTS IN THE CONTEMPORARY TYPOGRAPHIC CONTEXT

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ABSTRACT

The emergence of typography shifted written language into a mechanical tool of transmitting meaning, thereby further reducing the connection of representation of language with the language itself which began with the development of writing systems. Developed from various writing systems and languages, typography is the primary mode of visual communication of language. It has become even more important in the digital world we are living in today.

This research examines the relationship of Arabic script conventions and classifications in the context of typographic representation, and how typographic representations of the Arabic language have been distorted due to the influence of Latin typographic guidelines in the development of Arabic typefaces. This history has failed to produce Arabic typefaces that accord with the unique cultural, linguistic and contextual character of the Arabic writing system.

To address this, an investigation was carried out, through multiple design research methods and methodologies incorporating typographic studies and theories of embodiment applied to the evolution of the Arabic writing system, calligraphy and typography in the Arab region. The investigation aims to better understand, and respond to problems in the use of typefaces at the intersection of languages and cultures.

Through the generation of a typeface classificatory system, linking the ground rules of calligraphic scripts, structural influences of Arabic letterforms, and adapting them into existing typefaces used today, this research proposes a tool to assist designers in the making of typographic decisions in the setting of Arabic language, and in its relationship to roman typography.

Key words : Typography, classificatory attributes, Arabic language, culture, linguistics, embodiment

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1 | INTRODUCTION

Cross-cultural and cross-lingual communication are increasingly important to human society. The borders of the world are opening up to one another to a greater extent than ever today due to current economic and geopolitical factors, as well as the burgeoning of communication technologies. This has led to the emergence of vigorous multi-cultural-lingual nations.

Today as you walk down the streets, you can notice a large number of languages and writing systems being displayed—with English, rendered in its Latin script being the most dominant— but the question is, are all these writing systems used appropriately in their context? Do certain choices of typeface convey the same intended meaning in all languages? As is typically the case with language, some aspects are culturally specific, whereas others transcend cultures. This is also the case with the visual representations of language, scripts and typography.

An example of a writing system that is culturally and aesthetically comprised in the contemporary design context is the Arabic system, resulting in a lack of cautiousness and sensitivity when it comes to the use of Arabic typefaces.

This research has been conducted to propose better ways of understanding and responding to the use of Arabic typography, through investigating structural influences of Arabic letterforms, typographic units in scripts and typefaces, along with the effect of culture and language on human perception.

1.1 BACKGROUND & CONTEXT

Experiencing the current situation, as a designer from the Arab region, was the inspiration for my research. An environmental scan resulted in my gaining insight into some of the main reasons for the uninformed usage of Arabic typefaces, the effect it has on graphic design in the Arab region, and led to my exploring the conventional approaches designers follow today to utilize Arabic typography in multi-script design platforms.

1.1.1 FROM THE EYE OF A DESIGNER, TO A PERCEIVER

As a graphic designer, specialized in both Typography and Editorial design, I have always encountered a vast number of typefaces and script designs. From the eye of a designer, when dealing with type-faces of different writing systems, you might think about the contexts these letters are being used in, the language it is written in, and the message these letters are trying to convey. But how would other eyes perceive a certain choice of type, and react towards it and the content it communicates?

Today, designers using Arabic typefaces know less about the Arabic writing system, and more about aesthetics. They care more about the look of a written piece, instead of the meaning of the piece (Chahine & Dobres, 2020). This leads type designers to focusing more on creating readable, legible and aesthetically pleasing fonts rather than the use of existing fonts in their desired function.

In typography, the essence of a word could be reinforced through the choice of typeface, with the association of type elements, by which means one can get an emotional response (Dair, 1967). Consider the example in figure 1.1, I have used the phrase "All Free !" in a blackletter originating typeface. Blackletter script was a script used throughout Western Europe from the 1100's until the 17th century, however it has never come to be obsolete (Dowding, 1962). Today we still tend to see this style of typeface used in modern posters and products, such as headings in certificates, diplomas, and newspapers, in addition to beer labels and heavy metal bands (Heller & Cassandre, 2003).

FIGURE 1.1

All Free ! Blacklettring. Shows the phrase "All Free!" in blackletter-orig-inating font, along with different uses of the script through history, hence influencing the connotations the letters convey.

All Free !

1455	1500	1933	1941	today
used in Gutenberg Bible	*only used by Germans*	*Fraktur declared as a "Volk" script by Hilter*	*Nazis abandoned Fraktur, as it was of Jewish origins*	*used in different labels and headings*
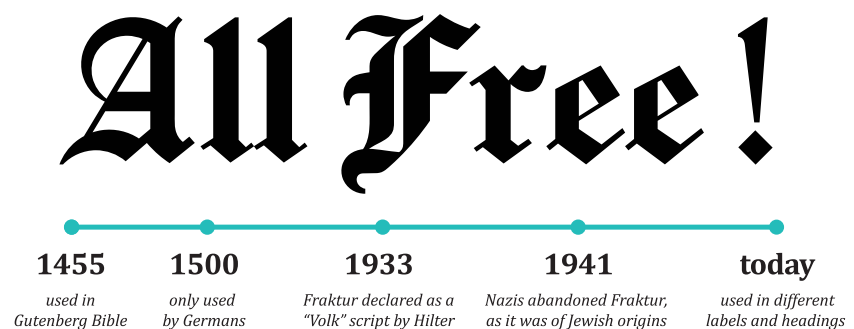
When looking at word-pictures produced by the arrangement of letters "All Free !", the kind of type used could convey different messages, according to the experience the viewer predates from it. As seen in the figure 1.1, blackletter was first printed in the Gutenberg Bible, which was the first book produced using moveable type. Later it was adopted by the Nazis during the 1930's, and today you can see this script on different labels. So this script can carry different connotations, to different viewers. Thereby, one can optimize type choice by considering the intended meaning of the semantic content, the intrinsic aesthetic qualities of the typeface, as well as the number of conscious and unconscious contexts that the text and its typographic representation are informed by (Heller & Cassandre, 2003).

Table 1.1 shows a number of connotations this script could convey according to different influences it has predated from, each of these connotations have evolved, thus more than one may be inferred at the same time. Hence the word "All Free !" could have different meanings, according to the context is it being used in, and expected experiences end-users have been through.

Table of Connotations. A number of connotations this script could convey is shown according to different influences it has predated from. These connotations evolve, and more than one may be inferred at the same time.

Year of Usage	Context	Connotations
1455 - Gutenberg Bible	Signaling a new era in printing books and bibles	Religious connotations Industrialized connotation
1500 - Abandoned due to its low readability	Only used by Germans.	German land connotation. Script to be used in headings
1933 - Adopted by Nazis	Considered as a "Volks" script by Hitler. Mainly focused on using "Fraktur" as their type of blackletter. Massively used by Nazis	Political connotations
1941 - "Fraktur" was abandoned by Nazi's, because it claimed to be of Jewish origin	Jewish oriented type, which steered to represent the Jews, rather than Nazis	Political, and religious connotations
Today - used on labels and headings	Beer labels, metal bands posters, diploma and newspaper headings	Ideological connotations

In addition to the context, another effect on perceived connotations is the choice of words, these typefaces can represent. For example the word "War" in blackletter could suggest Nazism, whereas the word "peace" could suggest the context in a bible. Words, type choice and context are a triangle each of which determines one another.

1.1.2 APPREHENDING MULTI-SCRIPT PAIRING

Both Latin and Arabic scripts are typefaces used in the Arab region, yet each script has certain characteristics, and each characteristic can convey a different message to a certain person as discussed in the previous section. Figure 1.2 shows a commonly Arabic-Latin coupled font choice. Notice that both typefaces share similar structural characteristics. Both are undecorated, have limited width variations, and bold, however when considering the source of which each typeface was derived from, compatibility ends. The Latin typeface has connotations of industrial modernism, with its skeletal form essentially that of an abstracted version of the dominant scribal style of the Carolingian renaissance origin in in the late 1800s (Meggs & Purvis, 2011).The Arabic typeface has an almost identical weight and stroke structure, but its basic letterforms are based on the Kufic Script category, which has connotations of religious texts, back to the 500s (Abifares, 2000), with industrial connotations absent. The Latin sans serif is thus grounded in European history, while the Arabic typeface combines an arbitrary (in terms of history) form with a structure that visually resonates with the Latin face, but lacking its cultural and historical grounding. It might be considered a kind of typographic European hegemony.

FIGURE 1.2

Multi-script Pairing. A choice of multi-script pairing of Arabic and Latin script. Both choice of fonts share similar structural characteristics, but incompatible in the path of evolution and emergence.

Aa Bb | العربية

Such coupling, could lead to unconscious translation with the association of the context, hence conveying unintended messages and meanings, just like *the "All Free !" example in section 1.1.1 in this chapter.* This leads to another problem : the affective message being displayed in different languages will not be equally conveyed to people. The example in figure 1.3 gives a different perception of the example mentioned in the previous example.

FIGURE 1.3

From Age of Script to Type. In the top the original Kufic calligraphic script, transitioning into a modern typeface used today in Arabic. Parallel is Blackletter calligraphic scripts transitioning to modern typefaces used today in Latin. Resulting in different connotations and messages

من تاريخ الخط إلى اليوم

Kufic font **-** orginates from
calligraphic style in 600s

Kufic derived font **-**
created in 2000s

From age of script to Type

Blackletter font **-** originates
calligraphic style in 1300s

Neo-grotesque font **-**
appeared in 1900s

▶ 1900s

Figure 1.3 shows the transition from the originating Kufic script, onto the "modern" typeface used in figure 1.2. The second line however, shows an example of a Blackletter calligraphic script, which served its first function as the Kufic back in history. Both Kufic, and Blackletter were used in religious books (Kufic in Quraan, and Blackletter in Bible), moving through time, both modern typefaces which I have used in figure 1.2 have been created. The Latin Neo-grotesque font emerged during the Industrial Revolution as a radical development of Roman text faces that had evolved since the advent of the printing press. The typography of the Industrial Revolution ignored many of the established formal conventions of roman typefaces, disrupting continuity with older scripts, resulting in a disconnection of context and a new visual vocabulary of affective meaning and associations. On the other hand, the Arabic script is still considered a Kufic-derived typeface, still carrying along its historic, and religious connotations, although part of its elements (such as guidelines, and letter proportions) have been latinized.

As a result, considering the two scripts in figure 1.2, the Latin type choice could convey a message, that the Arabic type choice fails to convey, and vice versa.

1.1.3 THE PAIRING APPROACHES USED TODAY

Globalization and localization has made bridging cultures more important. The interest of international brands in the Arab Region

markets, particularly the Arabian Gulf, has led to the need to adapt Latin logos to Arabic. Because the majority of the region's population are Arabic speakers, having a translated, and adapted Arabic logo complementing the Latin one would help in including the Arabian population into the market, since a Latin one would be unreadable, and meaningless (Sakkal, 2006). To protect the international brand's intellectual property rights in the Arab region, visually compatible logos should be produced, regardless of the difference in the scripts used (Al Sultani & Deans, 2015). As a balance of respecting a brand's identity, and the culture of which it is marketed in, designers are routinely engaged in the practice of producing bilingual versions of logotypes as an approach towards inclusion.

The visual compatibility between both Latin and Arabic logotypes is essential, because it also helps the viewer grasp the established identity of the brand within the environment. This also achieves a sense of order, harmony and credibility with a unified appearance (Sakkal, 2006). Although designers deal with different scripts, to have a successful visual compatibility within both languages, it is necessary to apply modifications in letterform structures and visual attributes. However, in my opinion it is a challenging job, as one should be very cautious how elements are modified in order to sustain the cultural norms and writing style construction of both languages. Examples of bilingual international brand logotypes are shown in figure 1.4 and figure 1.5.

FIGURE 1.4

Stuart Weitzman Bilingual Logo. Global brand's logotype in latin, along with the complimentary Arabic version designed by the Jordanian Designer Hussein Alazaat.

FIGURE 1.5

Givenchy Bilingual Logo. Global brand's logotype in latin, along with the complementary Arabic version designed by the Jordanian Designer Hussein Alazaat.

Remedy's Wellness Pharmacy Logo, designed by Warsheh Studio based in Jordan

Shams El Balad Logo, designed by Jordanian designer Omar Al Zou'bi

Cafe Haroun Logo, designed by Jordanian designer Omar Al Zou'bi

Although in both examples, the letter structure of Arabic script is not highly enhanced, the goal of producing a visually compatible logo, outweighs the importance of maintaining the language's letter structure. The fact of considering a translation to the people is more than enough to respect their culture in such cases. In my opinion the use of dots among the Arabic word form has optimized the Arabic norms of lettering in both examples.

As is the case with international brands, to unify the look within the market of bilingual logotypes designers within the Arab region today are routinely engaged in creating multilingual logotypes for even locally produced brands. Through my experience as a graphic designer, and my interviews with designers practicing within my field, we all tend to follow four common techniques when coupling Arabic script with the Latin. These are are :

1. High visual contrast, and conceptual compatibility:
This type of coupling focuses on the fact that each script should convey its meaning through the use of strong conceptual typefaces, yet structurally both scripts are visually incompatible. as seen in figure 1.6.

2. Highlighting one script as primary, where as the other as secondary:
In this type of matchmaking, designers tend to treat one script as the primary one, which is often calligraphically inspired artwork , whereas the other script as a secondary one, rendered in an existing typeface, .as seen in figure 1.7.

3. Using script of the same weight to the exclusion of other considerations:
This type of coupling is the prevalent way of combining both typefaces, it is where designers tend to use certain multi-lingual typefaces.

4. Customized biscript also known as the "Frankenstein" approach:
A way of coupling typefaces that most designers are against both In Arabic and Latin, which involves cutting off elements from a Latin typeface, and implementing it in a deformed Arabic typeface, as seen in figure 1.8.

This is how local designers tend to find their way in solving the problem of combining scripts. It is a significant challenge to successfully combine both scripts together, due to the scarcity of Arabic typefaces, difference in the structure of both scripts, and anatomic attributes.

1.2 RESEARCH CONTRIBUTORS

1.2.1 PROBLEM SPACE

It is said that language, along with its writing system, evolves in order to preserve itself, and make it easier to be recognized by future generation (Perfetti & Liu, 2005). The mechanization of a writing system, as well as the emergence of typography, shifted written language into a mechanical tool of transmitting meaning. This is why visual representations of languages lose the human touch in their letterforms, reducing their ability to appropriately convey cultural connotations. Just like latin, the Arabic writing system has lost its communicative potential in conveying certain messages, after shifting from scribal production, to print. However the Latin script overcame this problem with a large number of typefaces of varying styles and visual attributes that evolved beginning in the Industrial revolution and beyond (due to the shift from demand driven economy to a supply driven one). Especially in phonetic systems, typography reduces the connection of representation of language with the language itself, which leads to two main problems of its use. Firstly, the lack of typographic guidelines that are based on the origin of the writing system, making Arabic letterforms and anatomy deformed, as they have emerged from latin typographic guidelines, with a slight adaptation to the Arabic script's structure and letterforms, therefore losing aspects of the Arabic scripts identity. Secondly, the scarcity of Arabic typefaces, which is a causal effect of the first mentioned problem. This scarcity results in a small range of typeface choices, which can lead to a limited ability for type to successfully accord visual quality of type with the semantic content. Through investigating the evolution of the Arabic writing system, one might find the missing link between scribe and print, hence generating attributes to redefine typographic elements; that will inform a more culturally, linguistically and contextually appropriate typographic approach.

1.2.2 PURPOSE OF RESEARCH

The purpose of this research is to examine the evolution of the Arabic writing system, along with analyzing structural influences of Arabic letterforms, and typographic units in scripts and typefaces, in order to generate a typeface classification system. This has the potential to inform a more appropriate typographic approach that is synergistic with the unique cultural, linguistic and contextual essence of the Arabic writing system.

1.2.3 AFFECTED PEOPLE & END-USERS

This investigation, along with the generated outcome of a typeface classification system is aimed to assist typographers, and graphic designers, both in the eastern, and western culture in making typographic decisions in the setting of Arabic language and writing system,in relation to roman typography. Additionally, to enrich the cultural experience of the Arabic-speaking public who are constantly exposed to typography in their environment.

1.2.4 RESEARCH QUESTIONS

How can typeform classification attributes aid in using Arabic typefaces to elicit affective3 understanding of communicated content ?

How can historical analysis of the Arabic writing system aid in interpreting the missing link between calligraphy and typography?

How did the Arabic language, culture and religion contribute to structural influences of Arabic letterforms, and scripts?

What approaches are graphic and type designers considering today to culturally and affectively optimize, appropriate usage of Arabic typefaces?

How does the hypothesis of embodiment contribute to structural influences of Arabic letterforms, and typographic units in scripts and typefaces?

What attributes do existing typeface classification systems refer to when categorizing typefaces and scripts?

1.2.5 RESEARCH OBJECTIVES

My research questions guided me in establishing my research objectives.

First, examine the Arabic writing system, its linguistic and structural components, along with its evolution through time, and the contribution of language culture and religion towards its formation, and functionality.

Second, get a closer look into typographic and scribal practices in the Arab region, by interviewing graphic (and type) designers and calligraphers.

Third, explore the hypothesis of embodiment, and find the link between past scribal practices, and typographic attributes we can reconsider today in Arabic typefaces.

Finally, adapt existing type classification systems to highlight attributes, characteristics and frameworks that could optimize type choice in communicating affective meaning, and inform type designers who design Arabic typefaces.

1.3 RESEARCH METHODOLOGY AND DESIGN

1.3.1 FIELDS OF KNOWLEDGE

Before setting out my research methods and design, I listed the fields of knowledge I needed to explore in order to find my area of investigation. Diagram 1.1 shows the four fields of knowledge, intersecting at the area of investigation.

Typography
(structural, and anatomic attributes, type classification systems)

Embodied Cognition
(effect of embodiment on scribal practice, and typography)

Language
(formation of writing system, letterforms, and structure)

Writing System & Script
(evolution of writing system, and art of scripts)

Area of Investigation
(through literature research, interviews, and qualitative observation)
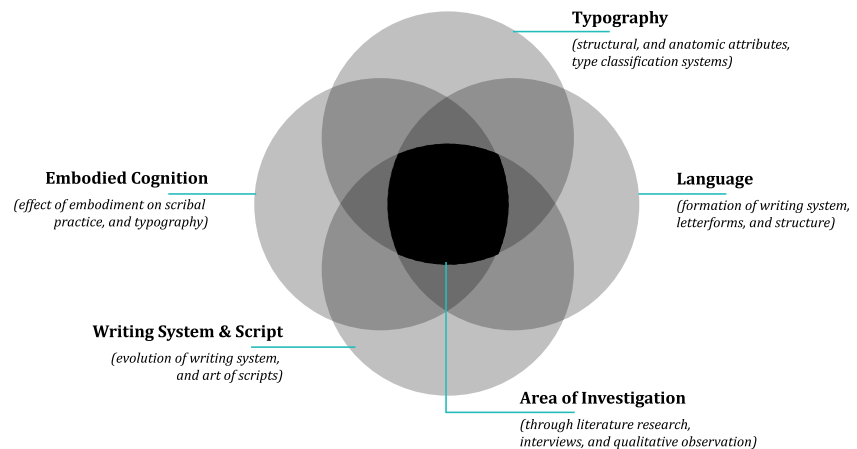
1.3.2 RESEARCH METHODOLOGY

My research was informed by three different methods, which included literature research and environmental scan, subject matter semi-structured interviews, and qualitative observation. Below methods are described in details, in relation to the fields of knowledge I covered along.

Literature Research and Environmental Scan: in this section I was able to investigate the following topics.

1. Arabic Writing System through history (examine its linguistic and structural components, along with its evolution through time, and the contribution of language culture and religion towards its formation, and functionality).

2. Typography (studying the attributes, characteristics and frame-works of previously made works regarding type design and classification systems that could optimize type choice in Latin and Arabic)

3. Semiotics and embodiment (exploring the hypothesis of embodiment, to find the link between past scribal practices, and typographic attributes we can reconsider today in Arabic typefaces)

Fields of knowledge covered: Writing system and scripture, typography, Language, and cognitive science

Subject matter expert Interviews: this section helped me in enriching my findings. I was able to conduct semi-structured interviews with experts in the field of design, typography, and calligraphy in the Arab region, mainly in Amman, Jordan. Experts included:

1. Arabic graphic designers (immersing myself into typographic and scribal practices in the Arab region, consideration of language, culture in multi-script platforms).

2. Arabic Calligraphers (exploring the hypothesis of embodiment, to find the link between past scribal practices, and typographic attributes we can reconsider today in Arabic typefaces, their and contribution towards culture).

Fields of knowledge covered: Writing system and scripture, typography, and cognitive science

Qualitative Observation: carrying out inductive techniques in creating a classification framework that would guide Arabic typeface users (typographers and graphic designers) with their type choice:

1. Study the ground attributes of the six Arabic writing styles (Kufic, Thuluth, Diwani, Reqqa, Naskh, and Nasta'liq). Attributes are type-form classification, cultural and linguistic related"

2. Investigate attributes and approaches followed in previous classification systems, either Latin of Arabic.

Fields of knowledge covered: Writing system and scripture, typography, Language, and cognitive science

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1.3.3 RESEARCH DESIGN

The process of my research was not linear. Diagram 1.2 shows how I underwent my research process, which made me move back and forth in my methods . The shaded area represents the process I have covered, leaving the unshaded for future work.

Research Design Process. As three main steps within my research, which are exploration, generation and evaluation. When looking closer into the process, then the parts of the process are divided into observation, research, ideation, evaluation and implementation. Shaded area represents the undergone stages.

OBSERVE RESEARCH / ANALYZE IDEATE EVALUATE IMPLEMENT

ITERATE

EXPLORE GENERATE EVALUATE
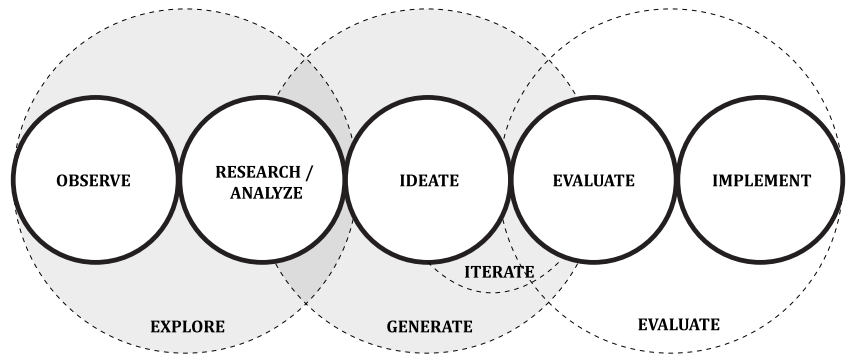
2 | LET'S TALK ARABIC

2.1 INTRODUCTORY TO ARABIC SCRIPT

After Latin and Chinese, the Arabic script is considered the third most widely used writing system in the world. Having been adopted by a number of countries in Asia and Africa, today Arabic is used in languages such as Farsi, Pashto Urdu, Dari, and Old Turkic as well as Arabic. Just like any script, the Arabic script has evolved in various channels in order to adopt different tongues. However, maintaining two of its main structural attributes, which are the direction of reading and writing, which remained from right to left, and its letterforms, which remained connected.

Due to its differences from the Latin script, with which we are the most familiar, this chapter will cover the essential aspects of the Arabic writing system by introducing its linguistic and structural elements. The chapter is a prerequisite to the whole paper, as it will allow the reader to get a basic understanding of the Arabic script, language, and the practice of calligraphy and typography on such a writing system.

2.2 THE SCRIPT & ITS COMPONENTS

Connectivity, direction of writing, and its ability to cover more than one language world wide had led the Arabic writing system to generate new forms, and components to help it adapt in its new realms. This section of the chapter discusses components that belong to the Arabic writing system, which make it the complex system we read and write today.

2.2.1 ALPHABETS OF ARABIC

There are three systems of sound representation that the Arabic writing system consists of, which are letterforms, diacritic dots (known as nikat) , and diacritic marks (known as taskhil). Figure 2.1 shows you the three systems represented together, in a single word.

Note that the first two systems, letterforms and diacritic dots, are inseparable, as dots are used to distinguish between letters that share the same basic letterforms, but represent different sounds (AbiFares, 2000). However the third system, which is the use of diacritic marks, which depend on the system of grammar and pronunciation.

diacritics for word vocalization

letterforms forming the full word "Katab"

single dot to pronounce the baa consonant

....
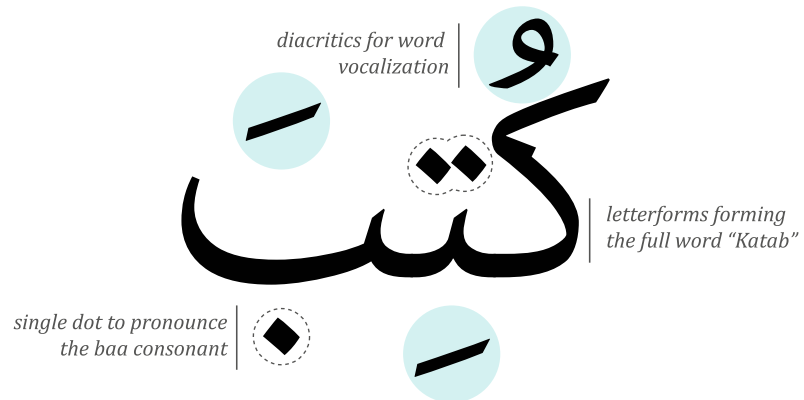
2.2.1.1 LETTERFORMS

The first system of sound representation are the basic letterforms, which are only letter shapes with no dots. The script consists of 18 letterforms, unlike Latin script, the Arabic script is a single case system. Figure 2.2 shows the listed basic letterforms.

ع ط ص س ر د ح ا ب

ی و ه ن م ل ك ق ف

....
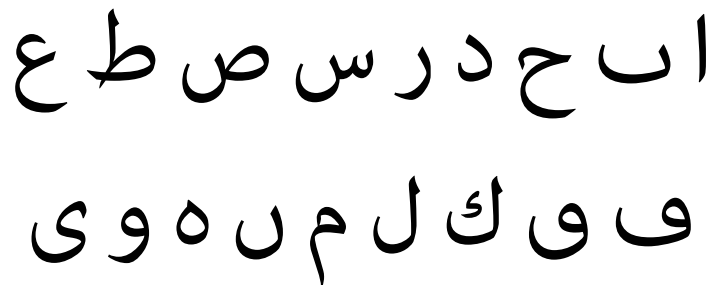
2.2.1.2 DIACRITIC DOTS (NUQAT)

The second system of sound representation are the diacritic dots. Focusing on Arabic language as the least common denominator in

the number of dots among Arabic script using languages, dots can add up to three on a single basic letterform. The addition of dots to the letters will complete the Arabic language alphabets, which are composed of 28 letters (Smitshuijzen, 2009). Figure 2.3 shows different possibilities in which a dot is used on a basic letterform. You can notice that the number and position of the dot, determines the sound the letter represents.

Diacritic Dots (Nuqat). Different possibilities in which a dot is used on basic letterforms, number and position of dots determines the sound of the letter

ث ت ب | ج خ ح

"thaa"   *"taa"*   *"baa"*   *"jeem"*   *"khaa"*   *"haa"*
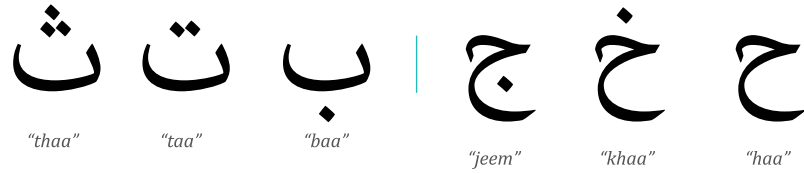
2.2.1.3 DIACRITIC MARKS (TASHKIL)

The third system of sound representation are the diacritic marks, or tashkil. Their main function is to vocalize words, and letters according to its grammatical position within a sentence (Janbi & Suen, 2016). Vocalizing a word or letter, through adding vowel-like pronunciations, will provide extended meaning to the form being represented, as tashkil provides the right pronunciation of a word, and the meaning of it. However it became an important decorative aspect in some scribal styles. Figure 2.4 shows the eight diacritic marks used in Arabic language. To cover more languages, more diacritic marks were produced.

Diacritic Marks (Tashkil). The eight diacritic marks used in arabic language. Circle indicates the position of the letter.

"dama"   *"shadda"*   *"kasra"*   *"fatha"*   *"sokoun"*   *"tanween dam"*   *"tanween kasr"*   *"tanween fateh"*
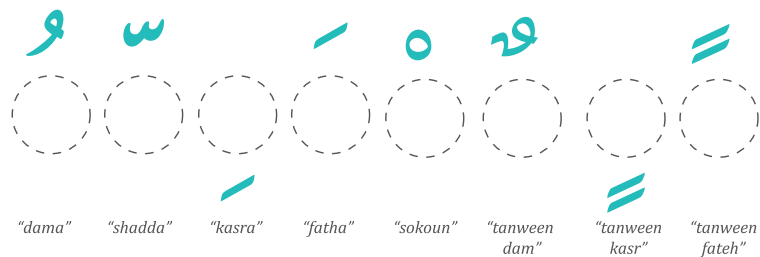
2.2.2 CURSIVITY & CONNECTIVITY

As mentioned in the beginning of this chapter, one of the persistent structural characteristics of the Arabic writing system is that its word forms have remained cursive and connected, even after its introduction to print, and moveable type. To achieve these two structural characteristics led some letters to have four forms (named glyphs in typography) per letter according to its position in a word (AbiFares, 2000). In addition to that, some typefaces offer a wider number of glyphs -which are single words, not letters-, in order to create words of a single stroke, these words are known as ligatures.

2.2.2.1 GLYPHS (4- DIFFERENT LETTER FORMS)

Some letters in the Arabic alphabet have four different forms, in order to adapt connectivity into any position within a word. Positional forms include (isolated, beginning, medial and ending forms), these are represented in Figure 2.5. In addition to the basic four forms, some calligraphic and scribal styles have forms beyond the basic ones, sharing variants of the letterform in its same position (Smitshuijzen, 2009).

FIGURE 2.5

Glyphs. Shows an example of the letter "meem" in two different fonts. One font has only four glyphs of the letter (isolated, beginning,medial, and ending), where the second font has five glyphs, where there are two versions of the ending glyph.

isolated glyph

isolated glyph

ending glyph

medial glyph

beginning glyph

ending glyph 2

ending glyph 1

medial glyph

beginning glyph

··
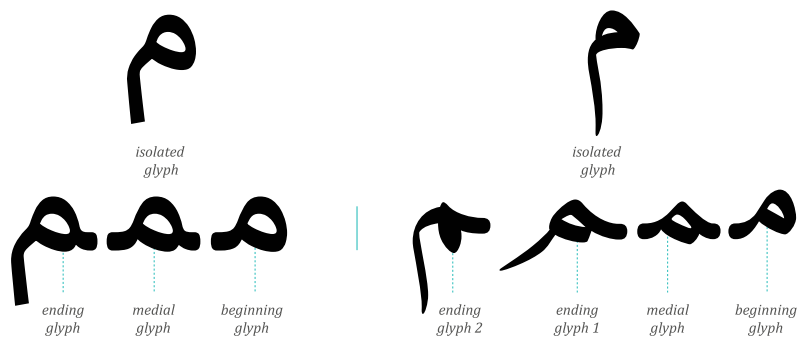
2.2.2.2 LIGATURES (DIFFERENT LETTER COMBINATIONS)

Ligatures are a familiar element in both Latin, and Arabic typography. It is when a combination of letters are formed in a single glyph. Ligatures are used for linguistic and scribal purposes. For example as the ash (/æ/) ligature shown in figure 2.6 the "a" and "e" are combined in Latin script to represent a new sound in a certain language. On the other hand, in figure 2.7 "laam" and "meem" letters are combined in a single glyph in Arabic to represent the calligraphic effect of a single line connecting all letters (Janbi & Suen, 2016).

Latin Ligatures. The Latin example of letter combination "a" and "e" produces the ash (/æ/). Made for a new pronounciation of a language.

(1)   *(2)*
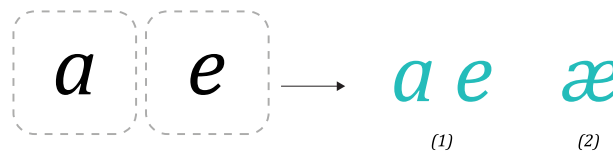
FIGURE 2.7

Arabic Ligatures. The Arabic example of letter combination "laam" and "meem" produces a single glyph to imitate the calligraphic effect of a single stroke.

(1)   *(2)*   *(meem)*   *(laam)*

··
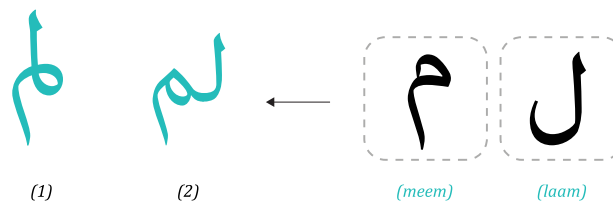
2.2.2.3 KASHIDA & THE KERN

Although kerning and tracking work with the separate letters of the latin system to achieve a desired line length, kerning and tracking are not applicable in Arabic typefaces because of the joined nature of the characters. Instead, the Arabic script uses the Kashida to manage horizontal distributions and proportions within the x-axis. A Kashida is a connecting line that could stretch letterforms, characters, and junctions within letters of a single word (AbiFares, 2000).

As was its function back in scribal practices, today Kashidas are in some scripts (Thuluth, and Kufic) used for decorative purposes to give emphasis on certain letters and strokes, and for typographical purposes to achieve full text justifications, as in Naskh as shown

in figure 2.8. Note that some scripts, such as the Reqqa and Diwani scripts, do not use Kashidas, because their main purpose is to minimize the space between letters as shown in figure 2.9.

كلمـــة

baseline
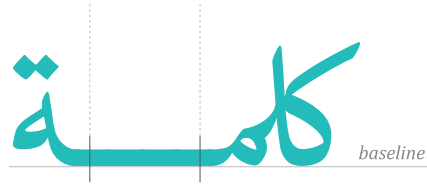
FIGURE 2.8

Applicable Kashidas. A Kashida applied on a Naskh-derived typeface. A Kashida in such context could be applied up to 12 pt.

كلمة

baseline

FIGURE 2.9

Non-applicable Kashidas. A Kashida is not applicable on a Reqqa derived typeface, because writing the shortest version of letter arrangement is important

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2.2.3 ARABIC LETTERFORM ANATOMY & GUIDELINES

To better explain letterform structure, in calligraphy and typography elements within a single letter are named. Unlike latin, type anatomy in Arabic does not have strictly-defined common names shared by all typographers and calligraphers. However names are derived from analogies in nature that resemble these anatomic elements, and scribal techniques which produce these elements. ***Refer to "Appendix A : Letterform Anatomy & Guidelines"*** to view anatomic elements, along with y-axis guidelines commonly shared by typographers. This diagram was deduced from a blogpost of type anatomy by 29lt, which I found most compatible with the terminologies calligraphers whom I interviewed back in Amman, Jordan use as well, when dealing with letterforms, structures and guidelines.

3 | IN THE ALLEY OF HISTORY

The previous chapter was a summary of what we see today in the Arabic writing system utilized in the Arabic Language. The Arabic writing system was born as a pragmatic means of spreading knowledge, however soon enough with the cultural bloom in the Islamic world, the aesthetic aspect was developed. The Arabic writing system has been growing, evolving, and diversifying until the present. This has happened to the extent that exaggerated modifications have been taken into account when it comes to letter structure and aesthetics. Such constant growth, evolution and diversification led to the emergence of different calligraphic traditions, and contemporary approaches in Arabic type design.

This chapter is an overview of the creation of the Arabic writing system. Taking the steps of stone inscriptions, all the way to the typographic, and calligraphic designs we see today. Outlining key moments of the writing system's formation and innovation, this section covers influences that made the Arabic writing system a medium of communication, information preservation and a unique form of visual representation.

Refer to "APPENDIX B : Creation & Early Evolution of Arabic Script", for a scope of history, and the contribution of Islam to the Arabic Writing System.

3.1 CALLIGRAPHIC GUIDELINES & CLASSIFICATORY SCHEMAS

Shifts from one dynasty to the next, the emergence of different scribal styles, and establishment of new linguistic rules for the Arabic written language marked a revival in the Arabic writing system. Correspondingly, refinement of the newly emerged scribal styles was required, in order to optimize the Arabic writing system structurally and visually, in order to achieve high legibility, high standards of grid systems, and letter structures that facilitate reading.

3.1.2 THE GLORIOUS MEN OF CALLIGRAPHY

Abu Ali-Mohammad bin Muqla (886-939), aimed in the tenth century to standardize the scribal styles (Abdel Qader, 2006). Instead of creating a new script, he applied a system of geometric reform to the writing of Arabic, which is based on its letterforms and structures, this method was to be applicable to existing variants of the Naskh script (Osborn, 2001). His method of standardization aimed in proportioning the size and shape of letters, relying on three parameters which are: the rhombic dot (the nuqta, which is the result of the nib head touching the surface), the height of alif (measured using the nuqta [different scripts follow different measurements]), and the circle (that has a diameter similar to the alif) as seen in figure 3.1 . His system reorganized the Arabic writing script, and provided a new approach towards it, as this system is still taught and practiced by calligraphers today.

Through qualitative observation, he was clearly able to distinguish constructional forms of Arabic letters, and the thickness and thinness of lines, along with the contrast of strokes within a letterform. This system resulted in the creation of well proportioned letters, through the recognition of distinct styles in relation to adopted proportions, whose basic measurement is the rhombic dot. Ibn Muqla's new system was the birth of visual consistency in the Arabic writing system, a well proportioned script became a reflection of balance and divinity. The Al-Khatt-Al-Mansub system was officially developed and used as a Mus'haf script.

Strict rules of the system created by Ibn Muqla created strong foundations for his successors to develop upon. In the eleventh century Abu Hasan-Ali bin Hilal, known as Ibn-al-Bawwab, one of the students who practiced under Ibn Muqla, was able to adopt his work through practice and continued on developing the system of geometry and proportions (El-Labad, 2014). Known for his talent of imitation, he learnt from scholars, and mastered his craft through imitating his scholars' techniques.

Following these strict rules of geometry and proportion, Ibn-al-Bawwab developed a new system in order to achieve better interletter proportions, believing that some letter elements are derived from

other elements (Bahnassi, 1995). This system shared measures and attributes for all letters that contain bowls and tails within their anatomy. Along with Ibn Muqla's system, Ibn-al-Bawwab's system has become one of the fundamental systems used when teaching the art of Arabic script and calligraphy (Osborn, 2001).

In addition to his talent as a calligrapher, Ibn-al-Bawwab's script illumination practice led him in producing a Mus'haf using the Naskh script, following the systematic laws of geometry and proportion created by Ibn Muqla. His illumination displayed great consistency of form and sophistication of design, which later made him famous among calligraphers and illumination for his consistency, elegance and harmony within his script (Safadi, 1979)

During the thirteenth century, Yaqut-al-Mutasimi, adopted the canon of Al-Aqlam-Al-Sitta, used during the Abbasid dynasty, and its application on Ibn Muqla's system in order to preserve them for future calligraphic practices. He was the reason behind glorifying Ibn Muqla's system in scribal innovations through generations.

Yaqut-al-Mutasimi was not only famous for his preservation of systems. What made his scribal practice famous was his method of trimming and shaping the reed pen. His new method of trimming the pen in a curved angle allowed the ink flow to be slower, hence producing scripts with elegance, and stroke thickness variations.

The creations of the three men Ibn Muqlah, Ibn al-Bawwab, and Yaqut-al-Mutasimi contributed significantly to the Arabic writing system and calligraphy. Their aim of standardizing letters allowed the Arabic writing system to adapt to whatever space and time it is shared in. Appropriate usages of Arabic scribal styles were rear-ranged, for example, the Naskh script, became a script used normally in both religious and administrative texts, whereas the Kufic, shifted from being the only Quranic scribal style to becoming an increasingly decorative script. Figure 3.1, figure 3.2, and figure 3.3 shows the three major guidelines of proportions and geometry created and developed among the three men (AbiFarès 2001).

FIGURE 3.1

Nizam-al-Nuqat. The System of the dot, letters are proportional to the dot, in relation to the letter "alef".
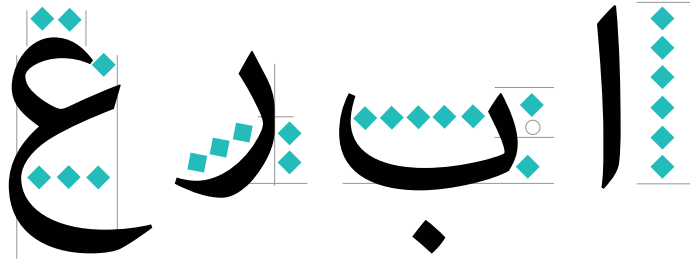
FIGURE 3.2

Nizam-al-Dairah. The System of the Circle, letters are proportional to the diameter of the circle, which is equal to the height of the letter "alef".
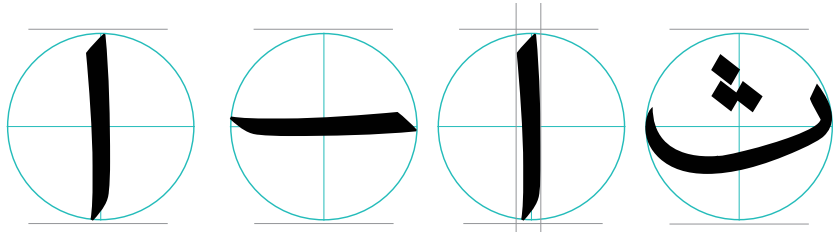
FIGURE 3.3

Nizam-al-Tashabuh. The System of Resemblance, where some letterforms share the same anatomy within their structure.
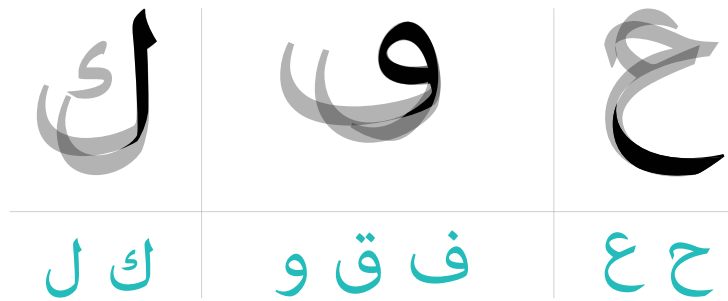
3.1.3 THE OTTOMAN EMPIRE SYSTEM OF SCRIPTS

Two hundred years separate traditional calligraphy and Arabic writing system guidelines from the Ottaman Empire, Shaykh Hamdullah Amasya repopulated Al-Aqlam-Al-Sitta, preserved by Yaqut al-Mutasimi among Ottoman scribes, calligraphers and illuminators (AbiFarès 2001) . As the number of scripts increased further, and styles became more systemized, a categorization of styles needed to take place, in order to differentiate script functions according to their appearance (Osborn, 2001). The systemization of scripts during the Ottoman empire relied on three major markers. These were the genre of which the script will be used for, the audience of the script will be read by, and the authorial source from where the script

originated. The visual appearance of the scripts defined the markers of which they will be used in, as previously mentioned, during the Ottoman empire each script had its own particular functions and purpose. Focusing mainly on Al-Aqlam-Al-Sitta, Ottoman scribes formalized the six pens into three pairs, which were used complementarity with one another. These pairing consisted of Thuluth and Naskh, Muhaqqaq and Rayhani, and Tawqi' and Reqqa, where each pair had one decorative display script, and a finer one used for body text (Abdel Qader, 2006).

Al-Aqlam-Sitta were not the only scripts used by Ottoman scribes. Further scripts referred to as chancellery scripts, were used along the systemization of scripts. The usage of the scripts were determined according to their size, complexity and even harmonic proportions. Writing styles were categorized in relation to the names of places, people, functions, paper and surfaces, tool, materials, intonation, geometric form, artistic form, and genre of writing.

TABLE 3.1

Scripts throughout History. A number of scripts that were used throughout history complimenting Al-Aqlam-Al-Sitta , along with their name derivative, and context of usage.

Script Name	Name Derivative	Usage
Ghubar Script	Style of writing (compactness in letterforms)	Used to write messages carried by pigeons
Jali Script	Named after a type of surface (paper type)	Standard script for running borders and the inscribed interior domes of mosques
Tumar Script	Named after a type of surface (paper type)	Used for Caliph Covenants
Mudawwar Script	Named after geometric form	Used for notebook writings, and documentation of speech
Ta'liq Script	Named after visual intonation	Used for texts in poetic books
Sikayat Script	Named after its function	Used in financial and land registers
Diwani Script	Named after its function	Used for Tugrah production (seal of Ottoman Sultans)
Al Haram Script	Named after its function	Script used for writings concerning princesses

Both Al-Aqlam-Al Sitta, and the previously mentioned additional scripts formed a system of form and function. The visual appearance of a single script contributed to its role as a communicative tool. Developing a systemized basis of visual appearance, proportions and geometry, and a semiotic system of form-function usage gave power to the Arabic writing script. The generation of this power resulted in serving both the beauty of the Quraan, and the Ottoman bureaucracy. Serving a field beyond Islamic religiosity and preservation was the reason behind the fall of the systemized Arabic writing system.

3.2 RISE OF MOVEABLE TYPE & THE OTTOMAN EMPIRE

This section discusses the loss of the previously mentioned systemized calligraphic, and Arabic writing guidelines, during the introduction of print into the Ottoman lands. The time mentioned in previous sections, was the time of which the Ottoman Empire witnessed its flourishing period. During the 1450's two events took place, which were thought to coincide, which were acquisition of Constantinople and the perfection of the art of printing using moveable type by Gutenberg. Employing the new method of printing by Christian printers was a way to overcome the threat of Ottoman invasion. Printing bibles helped maintain the unification of Christian groups, to stand against Turks (Eisenstein, 2005) (Osborn, 2001).

The print technology was known within the Ottoman lands as soon as it was perfected by Gutenberg. However the Ottomans did not officially embrace the print technology until 1726, when the first printing press opened on Ottoman lands. Print technology was not introduced as a new form of writing and communication, but a new form of information storage, and preservation. This objective was not pleasing to the Ottomans, which led to a hesitation to embrace Arabic moveable type. Mass-production of documents would be a threat to the Ottoman bureaucratic state, as their individually scribed texts were of high degree of secrecy and control. As they truly believed that there was no need for mass production and multiple printings since single documents are always produced, the efficiency of their script systemization was also in favor of the argument against movable type, as Ottoman scribal techniques had surpassed the technology of print in terms of categorization and systemization (Osborn , 2005).

Fear of challenges to the empires and concern about breakdown of the bureaucracy, had led the Sultan to threaten to execute anyone who engaged in the work of printing, which specifically included Ottoman Muslims,practicing the production of Arabic type, and printing documents. Although Arabic printing was specifically proscrible, print technology of other scripts and languages was embraced and developed in the Ottoman lands. During the 15th century Hebrew and Armenian presses were operating in Ottoman lands (Osborn 2005).

Banning Arabic printing production in the Ottoman lands did not prevent the west from experimenting with the printing technology for Arabic letters and writing systems. The distinctive traits of the Arabic script, and its widespread usage in the world, had led Europeans to experiment with the production. In 1514 The Book of Hours (Kitab Salat al-Sawa'i) was produced by typographer Francisco Griffo. This was the first attempt of foriegn printing with Arabic type (AbiFarès 2001). This foreign attempt to print with Arabic type was the starting point of the endless type production of latin-based Arabic typefaces. Various attempts to print Arabic type went on, until the first printing of the Quraan took place. It was said that it contained numerous textual errors, which included replacing diacritics, and confusion of letter structures (Abdulrazak 1990). Although Europeans still had a focus on producing Arabic type, and print, as the Ottoman lands, and Arabic speakers would be a perfect territory for their market, they shifted from producing religious genre prints, onto producing books, and prints that were translated, such as bibles, and other books that would benefit Christian converts, and Arabic speakers worldwide.

During the 16th century, the high demand for Arabic printed books led Sultan Murad III to allow importing books in Arabic, Persian and Turkish characters from the foriegn lands. He also started hiring scribers from the Ottoman and foreign lands in producing Arabic moveable type. Typographers included Jesuit Giambattista Eliano, who cut Arabic fonts in 1564. His types were used for over fifteen years, and Robert Granjon, who adopted Eliano's work and refined the cuts to establish formal clarity and aesthetics. Robert Granjon carried out a refinement of Eliano's Arabic type by using previous cursive Roman italics as the skeleton of the Arabic type. He produced three sets of fully ligatured Arabic type sets. Great achievements followed both typographers, in producing Arabic typefaces. Their

success in producing Arabic moveable type led to the establishment of different printing presses around the Arabic speaking region, which included Aleppo, Morocco, Saudia Arabia.

3.3 A SHIFT IN THE TYPE INDUSTRY IN THE ARAB REGION

As mentioned in the previous section, printing in Arabic was considered a threat to the power of the Ottoman empire. By the time Latin typography was evolving and developing in the 15th century, Arabic typography encountered obstacles to its progression due to political, religious and technical constraints. Delay in the production of Arabic type had led to foreign typographers producing Arabic typefaces, using their experience in Latin type production, latin guidelines, and baselines. Rather than using the strong systemized basis of the established proportional guidelines, styles and attributes, Arabic typography was initially produced by foreign typographers. Latin typographic systems, and guidelines, however systemized calligraphic traditions, and writing guidelines were further adopted in the practice of calligraphy.

These days, calligraphy is mainly used for aesthetic purposes and art (Janbi & Suen, 2016). Reducing the scribal styles into six writing styles was the first approach of the adoption of systemized calligraphic traditions back in history, mainly during the Abbasid period (see Appendix B). Each and every scribal style has carried conventional meanings until the present day therefore the six scripts used today in the field of calligraphy are used for certain visual displays, interpretations within history and islamic traditions, thus performing a certain function as a communicative tool. Al-Aqlam-Sitta witnessed a great evolution from the Abbasid period till today, that's why these scibral styles have been redefined numerous times in history, today they are more simplified (Haroun, 2019). The scribal styles include Kufic, Thuluth, Naskh, Reqqa, Diwani and Nasta'liq, all of which have a different visual appearance that makes it distinct from the others which will be mentioned in this section

----

3.3.1 AL-KHATT-AL-KUFI (KUFIC SCRIPT)

First used in the 6th century, the Kufic script was one of the first scripts to be used in writing the Quraanic verses of a Mus'haf It has evolved from the angular script of Khatt-al-Musnad (a refined version of the Arabic-Nabatean script) into a more geometrical and decorative direction today, hence used in decorative inscriptions. The Kufic script carries a distinctive visual appearance due to the combination of angular square lines, bold circular forms, and squarish letter proportions. It is a script well known for its monumental bold strokes, long ascenders and short descenders as shown in figure 3.4.

In contemporary type design, Arabic calligraphers tend to produce a wide number of typefaces inspired by the visual attributes of the Kufic Script. Such typefaces are widely used in multi-script branding, and modern designs.

FIGURE 3.4

Al-Khatt-al-Kufi. A typographic version of the Kufic script, shown as an example. The used typeface here is Diwan Kufi. Notice the adoption of its visual attributes, and guidelines.

Visual, structural and contextual attributes: thick angular lines, less anatomic guidelines, stroke weight is bold, short descenders, combination of angular square lines, and bold circles, extended horizontal strokes, geometric in style, high use of diacritics.

3.3.2 AL-KHATT-AL-THULUTH (THULUTH SCRIPT)

Created in the 7th century, it became fully standardized under the pen of Ibn-Muqla, by merging the Kufic script, along with previously used scripts. Used as a display script for titling, headings and long-running texts, the script is known for its elegant style, produced by thin, curved and oblique strokes. The angle of which the reed pen has been trimmed upon, is one-third of the nib head, this is how the script got its name, "Thuluth" meaning "one-third" in Arabic.

Although it is one of the most commonly used writing scripts today, it is the hardest to write. Calligraphy in general is considered a gifted talent, however the Thuluth script in specific requires the spirit and the art (Haroun, 2019). The style itself differs from one calligrapher to another, as hand movements, and reed pen grip matters when it comes to using a dynamic script like the Thuluth. Designing typefaces that are Thuluth-based is very rare, as the hand movement generates its dynamic visual attributes, however some typographers try to imitate the script's visual attributes. Even though they're applicable with digital tools, they are not highly enhanced, just like Latin script faces, some attributes include different glyph forms of the same letter, resulting in a single word having different shapes and structure, diacritic strokes differ in thickness, high usage of diacritics randomly placed for the sake of decorations and aesthetics rather than proper pronunciations, and connectivity should be highly achieved resulting in a word being a single structure.

Visual, structural and contextual attributes: light strokes that are thin oblique and curved, dynamic letter proportions, one-third of pen slope, slow speed written script, dynamic in letter proportions, contrast in stroke thickness (between forms and diacritics), high connectivity in letters, elegant in style, high use of diacritics, extensive usage of glyphs.

3.3.3 AL-KHATT-AL-NASKH (NASKH SCRIPT)

As part of Ibn Muqla's achievements, other than creating guidelines for both Kufic, and Thuluth scripts, he combined the two scripts to create and draw the Naskh Script. Although developed from two sophisticated scripts, Naskh evolved on its own path following simpler guidelines, making it a more legible style, used for body texts of books, prayer books, histories, general knowledge, and scientific texts, and today it is the official script used in the Mus'haf.

The Naskh Script is considered an everyday handwritten script, due to its small letters, with less complexity It is considered a fast written script for everyday errands, and copy. Because of the ease of pen when writing, and its flexibility, the Naskh script was the script to be adopted by educational sectors to be taught in schools as the common Arabic handwriting. As beginners, Arabic learners start practicing Naskh, as its letter structure is clear enough to learn, read and write, and as they move forward, they transfer onto the fastest written script which is the Reqqa script. Just like block printing is taught in primary stages in schools, followed by cursive.

When Arabic printing was adopted in the Ottoman lands, the hand-written Naskh became the standard model for produced typefaces. Today type designers tend to produce Naskh-derived typefaces as body texts, and a hybrid of both Naskh and Kufic have been popular-ized in the production of headings and titled texts. Figure 3.6 shows an example of Naskh derived typeface, and a Kufic-Naskh hybrid notice the adoption of its visual attributes, and guidelines.

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Visual, structural and contextual attributes: fast written script, flexible letter spacing, less letter complexity, small letters, flexible letter width, dynamic letter proportion, flexible guidelines, high letter clarity, high legibility, rounded letterform, thin strokes, horizontals are slightly slanted, bowl form resembles circle, Kashida only applied on bowls and midletters, no dynamic guidelines, low number of ligatures, contrast in stroke weight.

3.3.4 AL-KHATT-AL-REQQA (REQQA SCRIPT)

Its name means a small sheet of leather or paper, that is, any surface that could be used for writing. Just like its name, the Reqqa script was designed to be a simple script that could be speedly written with whatever source of pen or paper is abundant. Just like the Naskh

Script, due to its small sized letter, and flexibility in guidelines, the script could be used as a common handwritten script for everyday documentation, however letters are less complex and clear.

The script's distinctive visual attributes makes it the fastest and simplest written script, and [furtherly produced font]. It has a round fluid style, words are dense, forming a ligated structure (due to its high connectivity), its letter forms are flat, and a strong baseline holds letters together along with short ascenders and descenders. Reqqa script is known for its short letters and compactness, thus, although it's commonly used, it was never used in the Mus'haf. Its visual attributes allowed it to be used in official documents, and other books, along with it being a heading script before the print revolution.

Although any educated Arabic speaker can write in both Reqqa and Naskh Script as it is taught in primary, and elementary schools, not everyone can master the drawing of the script. Typefaces resembling the Reqqa script are an easy go-to, as it is a commonly used script, and allows diverse approaches in writing it. Typefaces derived from the Reqqa script are usually used by designers as titles, subheadings, and branding logos, as it can give a distinctively Arabic touch to an Arabic typeface (Alazaat, 2019).

Al-Khatt-al-Reqqa. A typographic version of Reqqa script, of the font Aref Reqqa. Notice the adoption of its visual attributes, and guidelines.

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Visual, structural and contextual attributes: Small letter size, no horizontal elongations (kashidas), round and fluid in style, most flexible guidelines, letters have short ascenders and descenders, fast written script, high connectivity, low letter detail and clarity, thick baseline.

3.3.5 AL-KHATT-AL-DIWANI (DIWANI SCRIPT)

Emerging in the 13th century, it reached its optimal importance and aestheticization in the 15th century, after the establishment of the scribal styles system. Diwani script was used to write official

Ottoman Sultan's responses, and it was the script for creating the Tugrah, an emblem designed for Sultans, as a seal. These seals are still seen today in Turkish monuments, buildings, historic documents, and coins.

Apart from its major role during the Ottoman Empire, the diwani script is a favored script today used for different applications, such as heading and title designs, on invitation cards, and official elegant documents. It's a script highly known for its extensive usage of curved strokes in one or two directions. Harmony of letters within a single word form is highly important; allowing breaking any of the guideline rules, such as baselines, ascender heights, and any solid position. This allows the script to have high connectivity, meaning preceding letters in a word have no certain position, but rather could go vertically above the succeeding letter or under. The diwani script shares two distinctive attributes with the previously mentioned Thuluth Script. Firstly, both are highly dynamic scripts that can have a high number of glyphs and ligatures, which therefore have different word, and letterforms, of the same word and letter. Secondly, both scripts have a serif-like structure outlined and filled in the beginning of some letters, which includes (alef, laam, and their designed ligatures).

Scribal styles that are more dynamic rely on hand-movements, and spontaneous decorative gestures, to give the script a number of decorative touches. Therefore, as it is with Thuluth, designing typefaces that are Diwani-based are rare, as the hand movement generated visual attributes, however some typographers try to imitate the script's visual attributes, yet errors can be found, as some attributes are hard to imitate using digital tools.

Al-Khatt-al-Diwani. A typographic version of Diwani script, of the font Diwani Letter. Notice the adoption of its visual attributes, and guidelines.

Visual, structural and contextual attributes: no vocalization marks, horizontally dynamic, strokes are circular and flexible, letters are hard to distinguish, heavy curves in one or two directions, has single baseline, harmony is more important than readability.

3.3.6 AL-NASKH-TA'LIQ (NASKH-TA'LIQ SCRIPT)

The Naskh-Ta'liq script, also known as Farisi, was derived from the combination of Thuluth and Naskh script. This hybrid script developed in the 15th century, and was principally used in copying romantic and mystical epics in Iran. The name Naskh-Taliq was given to this script, for its slanted horizontals. Lack of baseline guidelines allows random letter connectivity, meaning letters in a single word could be organized in different forms.

It is a script that is more aesthetically-focused rather than legibility-focused. Having flexible and dynamic characteristics allows its letters to flow from one to the other without reference to letter positioning and spacing. Its circular flexibility, caused by hand-movements, lowers the clarity of letters, which include similarities in the appearance of letters such as (daal, and raa). As shown in figure 3.9.

Naskh Script
Adobe Arabic Font

ر د

ر د

Naskh-Ta'liq Script
Kacst Farsi Font
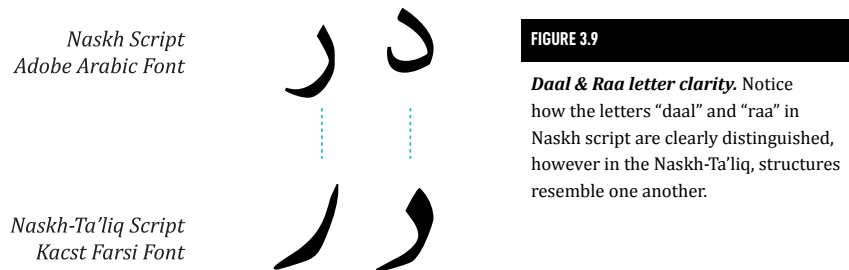
FIGURE 3.9

Daal & Raa letter clarity. Notice how the letters "daal" and "raa" in Naskh script are clearly distinguished, however in the Naskh-Ta'liq, structures resemble one another.

Although Naskh-Ta'liq focuses on hand-movements, and scribal spontaneity to achieve its visual and structural attributes, the script itself has been generated into a numerous number of typefaces today, just like Naskh in the Arab region, as it is a commonly used typeface in the Persian region.

FIGURE 3.10

Al-Naskh-Ta'liq. A typographic version of Naskh-Ta'liq script, of the font Kacst Farsi. Notice the adoption of its visual attributes, and guidelines

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Visual, structural and contextual attributes: no y-axis guidelines, no solid baseline, slanted horizontals, aesthetics more important that readability, dense word spacing, deep curved horizontals, high stroke weight, dots are replaced by wide horizontal swashes.

3.4 CALLIGRAPHY, TYPOGRAPHY & THE MISSING LINK

The scripts, referred to as al-Aqlam-al-Sitta today, have been intricately used by calligraphers in the Arab region until today. However, they only play the role of an inspirational tool in the world of type design. In the Arab region, when surfing through fonts, you can notice that there are three types of sources of which typographer base their font design on, either Arabic Calligraphic based (adopting visual, and structural attributes from any of al-Aqlam-al-Sitta), Latin based (adopting visual, and structural attributes from an existing latin font), or Freehand and experimental based (relying on existing concepts and producing letterforms through new hand techniques, and tools).

Breaking rigid rules to allow type designers to explore their options is a phrase favored by designers. However when it comes to designing an Arabic typeface, as all design fields, some principles and guidelines should be highlighted and focused on to provide the full affordance package of a typeface (which is it being a vessel communicating literal and effective meaning) (Dair, 1967). Therefore, when designing Arabic typefaces, one has to have adequate understanding and exposure to the original Arabic script, its structural guidelines, and formation, not only imitating visual attributes (Abulhab, 2008).

When thinking of characteristics one needs to grasp, learn, and understand when it comes to designing Arabic fonts, or choosing a typeface for a certain context, Saad D. Abulhab boiled them down into seven common features in his paper, Anatomy of an Arabetic Type Design. These Are glyph connectivity, multiple shapes per letter, ligatures, variable x-height values, overall horizontality and extensive use of dots and diacritics.

3.4.1 CONNECTIVITY, GLYPHS & LIGATURES

Unlike the Latin script, cursivity and connectivity remained a major attribute in the Arabic script, even after the adoption of movable type and the print technology. However, Arabic type design is still facing some difficulties in achieving this type of connectivity. When talking about connectivity, one not only focuses on having letterforms that are designed to connect to one another to form a single word, however, it is something beyond structure and form, which is discussed in Chapter 4 : Cognitive linguistics, Image Schemas & Embodiment. In order to achieve appropriate connectivity, a designer has to look deeper into the scheme of letter structure and form. Two of the major elements which achieve connectivity in the Arabic script when it comes to type design are glyphs and ligatures, which are multiple shapes per letter, and multiple letter organization per word. Only relatively recently, with the implementation of the OpenType standard, are these practically feasible.

As previously mentioned some scribal styles have different letter and word forms, as usually variants of letter positioning in a single word rely on the sponeusty of the hand-movements. That's why we tend to see full words, and letter combinations along the ligature list of a typeface specimen.Types of glyphs and ligatures can reflect attributes within a given scribal style, hence allowing designers know the function of the typeface, and decide the context of which it will be used in.

Achieving connectivity in type design, and flow of letters within a word, will not only reflect the scribal style, but also will reflect the writing speed, type of pen interruptions, and different positioning of shapes, glyphs and ligatures.

3.4.2 TOOTHY SPIKES & THEIR CHARACTERISTICS

Another element that plays as a hallmark of an Arabic script look and feel are the toothy spikes within a single word form. Considering Arabic letterforms in general, one might notice that some letters have more than one structural element that represents its overall form.

In order to allow connectivity between letterforms, and termination of element distribution per letter within the x-height, toothy spikes were created. This element is more of a typographical rule, rather than a historical attribute, which was created by scribers, in order to allow letter clarity, legibility and readability. When designing an Arabic typeface, Abulhab suggests that letterform width, height, and tooth shape can be used as a proportional ruler for letter structure and formation.

3.4.3 X-HEIGHT VALUE

Although the letter (x) does not exist within the Arabic script Alphabet, some designers refer to its height, as it is in the Latin script. Unlike latin, Arabic script does not have a uniform y-axis guidelines, but letters and elements are not also randomly distributed within the axis. To achieve a harmonious type design, resembling the Arabic script, Arabic script would have more than twelve y-axis guidelines (Janbi & Suen, 2016). However, type designers today tend to limit their y-axis guidelines to six, so that it could resemble Latin script characteristics, and would be easier for typeface users to pair them with Latin typefaces, as it is of higher demand in the market.

3.4.4 DOTS & DIACRITIC MARKS

Dots and vowel diacritic marks are not only normal dots, smaller characters that could be added to the typeset after all other letterforms, glyphs and ligatures have been fully designed. These two elements, that give the Arabic language, and writing system its identity, should be first on the list of glyph factors to be designed, as they determine the number of Arabic script using language it will cover, and proportions that should be followed in creating letter structures and forms.

In a grander scheme, the position of dots and diacritics, also determines how close the script is to either Arabic or Latin guidelines, when looking at a Latin/Arabic-based typeface continuum. When the typeface is Arabic-based— meaning it uses Arabic structural and proportional guidelines—dots and diacritic positions are specified relatively to the letterform structure, but when the typeface is Lat-

in-based, they are usually positioned according to a y-axis guideline, with less relativity of the letter form it is accompanied with.

3.5 A WRAP-UP OF THE CHAPTER

Covering this chapter has helped me understand the core characteristics of the Arabic writing system. Going back in history and understanding its stages of formation constructed a better road for me in drawing the outcome I am aiming to have by the end of research. As classificatory systems of scribal styles, and systemized guidelines of letter and script proportions were the key to the flourishing ages of the writing system, my aim on following the same concept would revive the Arabic writing system in the type design industry today.

The third section of the chapter has helped me into reading and having a wider exposure to the scribal styles that are used today by calligraphers, and type designers. Focusing on the concept that each scribal style had visual and structural appearance that determined its function made me dig deeper in understanding the attributes which makes them the masters of their function. Such attributes helped me to classify typefaces, and also would optimize my type choices accordingly when it comes to choosing a typeface for a desired function and context.

Saad D. Abulhab's paper Anatomy of an Arabetic Type Design was an eye opener to the extensive work I will be doing in creating my Arabic type classification system. His paper focused on elements that are not usually noticed by the naked eye. However these elements either Arabize, or Latinize a script.

Moving forward in my research, the next chapter will cover the effect that writing systems, and their attributes, have on human cognition and embodiment, focusing mainly on the scribal styles, and discusses how people can perceive elements of writing systems that enriches the scripts' affordance of being a communicative tool.

4 | EMBODIMENT & SCRIPT FEATURES

4.1 CONTRIBUTION OF EMBODIMENT TO SCRIPT FEATURES

Shifting from historical and structural observations focused on writing systems and typography, this chapter considers the role of embodiment in shaping script features. This is a step toward considering how people of diverse cultures and languages perceive scripts differently and similarly, depending on both recurring culturally-specific patterns and cross-cultural patterns they experience over time.

For this section, I describe my provisional version of the Embodiment Hypothesis (Wilson & Foglia, 2017), that I have adapted to better understand written scripts:

Embodiment is the idea that thought is a function of an individual's body coupled via sensory-motor interactions with an environment. Generally, the hypothesis, within the context of my focus on features of scripts, proposes that , diverse bodies, diverse environments, and diverse interactions among bodies and environments will influence (or shape) thoughts, as well as the widely-accepted concept that thoughts influence actions of the body, how they are situated environment, and interactions with others, as an environment also includes other individuals who are similarly coupled with environments via sensory-motor interactions.

Within the context of scripts and embodiment, I am considering how diverse bodies, environments, and interactions among individuals shape the visible forms of scripts. These visible forms are influenced by materials of the environment (such as the writing surface, writing tool, the physical and visual properties of inks) the anatomy of writer (the fingers, hands, and arms that enact the writing tasks); as well as fact that the written marks must be read, that is, perceived, recognized, distinguished, and interpreted by human eyes and minds.

A written script can take on a tangible or visible form that reflects (and thereby can be recruited to convey) an idea, quality and/or feeling that is shaped by (and is associated with) various aspects of

embodied interaction. As a result, the form can be taken as corresponding to one or more elements above, pertaining to embodiment just noted.

Diagram 4.1 shows my approach to linking the practice of typography, production of scripts, typefaces, and how these are influenced by bodies and their sensory-motor interaction in environments. What we perceive from the world (Diagram 4.1, Perception) is described relative to what we give to the world (Diagram 4.1, Muscle Memory [Practiced action]).

DIAGRAM 4.1

Linking Script to Embodiment. Shows a representation of the embodiment hypothesis, in relation to typography, production of scripts, and typefaces. Image schemas are recurring patterns of our perceptual interactions and motor programs, which give coherence and structure to our experiences (Hampe, 2006)

WHAT WE PERCIEVE-
what we extract from surroundings

Image Schemas formed from linguistic experience, and historical and cultural related context

↓

Arabic writing system attributes act as elements of image schemas

↓

Reccurring patterns of writing system's structure, letter and word forms, provide meaning to the sensory-motor experience

EMBODIMENT HUB
human body
(processing of motor-sensory experiences takes place)

perception of written script , coveyed linguistically, culturally and spiritually

calligraphy operates as a communicative tool through both image and text connatation through the hand movement of calligrapher

WHAT WE GIVE TO THE WORLD - *muscle memory & practiced action*

Contribution of embodiment to scribal production and calligraphy

↓

Scribe hand movement, grasp of reed pen and spiritual attributes translated to distincitve properties to communicated content

↓

Recurrance of hand movement results in creating the formal properties of Arabic script (letterform, connections, curvatures and cursivity)

4.1.1 WHAT WE PERCEIVE

Individuals experience the Arabic writing system's features (form, function, structure, and letterforms) as recurring patterns that, through learning in a culture and environment, gain meaning. The recognition and expression of these recurring letterform patterns

is what we mean by literacy. This does not only cover the linguistic aspect of the script, but also the culture of reading and writing. Considering a wordform as a visual work that combines elements we associate with images, on the one hand, and spoken words, on the other, helps demonstrate how wordforms convey more than semantic meaning (roughly understood here as the category that the wordform represents). Calligraphy recruits aesthetics, literary allusion, and religious symbolism to convey meaning (or messages) that encompass aspects of language, culture, and spirituality (Osborn, 2008). These meanings of messages are communicated via handwritten script, shaped through hand-movement, reed pen characteristics, and the experience and expertise of a calligrapher (Bayar & Sami, 2011). The rapid shift to typography, and computer-generated scripts, failed to integrate the previously listed influences into its letter forms, structure and typographic units.

When understanding the affordances of calligraphy, one might notice its effect it has on viewers. The art itself plays a communicative role between the viewer and the text, as it tempts the viewer to process the message a written piece holds through multiple semiotic codes (Osborn, 2008). All of this again is processed through the recurrences of patterns, that are given meaning through the sensory-motor experiences according to their context and location. Reconsidering the example of Blackletter in *figure 1.1 section 1.1.1 of Chapter 1*. When thinking of different associations one might have in relation to the type being used, one would notice that the meaning may be different from one receiver to the other. A perceiver could relate it to religious books and bibles, remembrance of the Nazis and holocaust, or their favorite metal rock band. So "All free!" could have different meanings beyond the semantic content.

Relating this to the previously mentioned six scripts (Al-Aqlam-Al-Sitta), these scripts had formed a semiotic system where influences of letter structure, hand movement, and script related markers contributed to the meaning of the communicated content. Audience, context, genre and pragmatics of textual, all played a role in extending the meaning of the communicated content beyond the linguistic aspect.

4.1.2 WHAT WE GIVE TO THE WORLD

Viewing the other section of Diagram 4.1, takes us to the other side of the writing system, which is the contribution of embodiment to the scribal production.

Calligraphy is a practice that is learned over a period of time, and through various levels of apprenticeship. A calligrapher can only practice script production after achieving the embedding of hand movements, reed pen grasps, and spiritual attributes into his/ her talent. The recurrence of this experience, shaped by the body, results in integrating formal qualities of the Arabic script, including distinctive letterforms, connections, curvatures and cursivity. In this way calligraphy operates as a communicative device through both image and text, along with integral patterns that affect the human perception.

The distinctive qualities of handwriting and fine penmanship plays a significant communicative role in Arabic script (Bayar & Sami, 2011). As the Arabic script is influenced by its language structure, culture, and practiced religion, Arab perceivers tend to locate appropriately conveyed messages when one of the six scripts has been used as a display of a communicative form. On the other hand when using Latin influenced Arabic typefaces, designers tend to focus on structural attributes, that are compatible with the context, of which the font will be displayed in. This could be the case in other scripts, which transcend linguistic, cultural and traditional practice characteristics.

FIGURE 4.1

The Connotation of Mohammad.
Two different word forms of the same letter pattern are shown here. Mohammad is a common name in the Arab culture, and is the name of the Islamic Prophet. Example 1 shows a simplified version of the typed name, example 2 shows a calligraphic ligature of the name (markers pointing out calligraphic attributes), usually found in the Quraan, religious inscriptions and art, when referring to the prophet.

reed pen angle

vertical connection

2

1
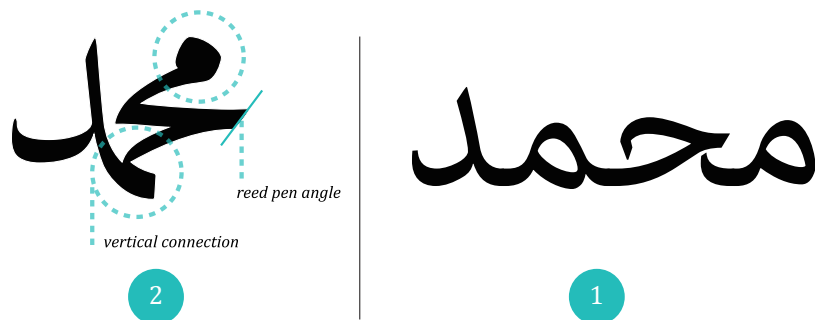
As shown in figure 4.1, there are two word forms of the same letter pattern. The word being used is Mohammad, which is a common male name in the Arab culture, and is the name of the Islamic prophet. Example 1, shows a linear organization of the name, however, example 2 shows a calligraphic driven ligature, where markers point out calligraphic attributes (such as closed shapes, the reed pen angle, and the vertical letter connectivity). This ligature is usually found in the Quraan, religious inscriptions and art. As a simple investigation, I have asked a number of people, from the Arab region (who read Arabic, share the same cultural background, and are found with the Islamic culture) to read both names. When reading the first example, people read it as (Mohammad), which is a common way, to call the male name. On the other hand when I asked people to read the second example, they referred to it as (Mohammad sallah Allah Alaih wa sallam) which translates to "Mohammad, peace be upon him". To further extend my investigation, I referred to subjects who practiced the religion of Islam, but are not Arabic speakers. It was surprising that non-Arabic speakers tend to recognize the version in example 2, but not in example 1.

When it comes to using a calligraphic or Latin based typefaces. But a designer should focus on the audience's culture that these connotations depend on. Embodiment, and the pattern processing of image schemas is more of an involuntary response, which process connotations, and meaning differently. Therefore, it is always important for designers to trace back expected pattern sedimentation – the recurring patterns of certain experiences the brain stores- that their end-users have experienced in order to optimize the use of typefaces, and scripts in the desired context.

4.2 TYPE DESIGN AND ARABIC LETTERFORMS

Ever since the emergence of typography, and the printing press, letterforms and type moved away from calligraphic forms, breaking cultural connotations, on towards the production of a tremendous number of typefaces, serving different functions. Arabic letterforms, and their structural formation, was linguistically and culturally driven. Consequently, it has maintained its letterforms until today, even though the world has evolved into a more mechanical and digitized world.

Adaptation to the Arabic writing system's letterform and structure helped in maintaining some features it had in its calligraphic form and structure. Arabic typography emerged from Latin typographic rules. However, when carrying all the features mentioned above into the digitized world of computer produced typefaces. Computer tools, and typeface design, are still failing to adapt the Arabic writing system's distinctive features into them. Such features include the connectivity, and cursivity of the writing system, reed pen replacement tools, anatomic guidelines, and curvatures, though, as previously stated, these features are now easier to address than they were in the past.

4.2.1 LETTER CONNECTIVITY & CURSIVITY

As previously mentioned, one of the major properties of the Arabic writing system is its cursivity. A number of manifestos took place in order to disconnect Arabic letterforms and create a unified typeface, including Nasri Khattar's manifesto, along with other Arabic typographers. Their aim was to create a more condensed variety of Arabic letter glyphs in order to make it suitable for printing, as moveable type, onto today's computerized typefaces (Nammour, 2014). Transforming the cursive writing system into isolated letters, just like in Latin script, would definitely have eased the process of developing moveable type for Arabic, and creation of glyph sets today, but it would have broken the cultural continuity of the writing system with its roots.

Manifestos in creating simplified letterforms, were up to development, but it all stopped when typographers found their way in connecting Arabic letters with moveable type, and type design today . Although Arabic typefaces were designed in ways to produce connected word forms, they still have not achieved the features that a calligrapher's body movement, and reed pens can produce. When writing Arabic words, one should always consider the word as a single shape, however type design deals with letters as singular units, hence not achieving the harmonious connection which is achieved by hand. A string of letters could have various shapes, as shown in the example in figure 4.1, which means Arabic scripts require a wide number of letter glyphs and forms to achieve multiple variations of a single letter string (Bayar & Sami, 2011). This could be easily

achieved when handwritten, but when it comes to type design, a large number of ligatures should be pre-designed in order to achieve this word string variation.

4.2.2 REED PEN REPLACEMENT TOOLS

Writing systems were first practiced using tools that are abundant in the regions of its availability. In the Arab region, a nib made out of reed was needed to create scribal works. Each script required a certain technique in preparing the nib, on to a certain inclination which suits the structure and the strokes of the script (El-Labad, 2014). In Arabic script, letters are written directly with the nib's head, whereas other parts are drawn (El Khattat, 1986). Be that as it may, the part that is directly affected by the nib's head provides structural features of harmony, letter clarity, and complexities that are not produced by tools existing in the computer programs (Berry, 1999). Most digital tools today imitate both circular and flat nib heads, however until today computers are unable to imitate either the angle of the pen grip, or the pressure of the nib head on the paper, in order to be more compatible with any inclination a letter, or a word of any writing system requires (Bayar & Sami, 2011).

The most affected feature in Arabic letter forms by the nib is the curvature which is found in letter bowls, tails, along with other anatomic structures. Some Arabic letterforms require curves to connect with preceding or succeeding letters, such connection is achieved by the inclination of the nibs head. When using computer tools imitating a different inclination, curvatures will be affected, resulting in unstable letter connectivity.

4.2.3 BASELINE FLUIDITY

The dynamic nature of the Arabic writing system is a distinctive feature which gives it its aesthetics, and intonation, resulting in its ability not only to convey denotation, but also affect Having dynamic positions of anatomic structures, dots, and diacritics are easily achieved when written by hand. However, one of the main Latin typographic guidelines that are integrated into Arabic typography are the singular baseline, ascender and descender. Arabic vertical guidelines

could add up to twelve, whereas in Latin the maximum is six guide-lines (Abulhab, 2008). Sticking to the Latin ground rules leads us to a more stiff baseline when creating Arabic type, along with stiff ascenders, descenders, stem heights, and diacritic positions. Figure 4.2 shows an example of the difference between guidelines created for calligraphic based and Latin based typefaces.

DIAGRAM 4.2

Hand-movement Fluidity. Shows an example of the difference between guidelines created for calligraphic based and Latin based typefaces. Top example is a calligraphic based typeface, and the bottom example is a Latin based typeface.

5 | TYPEFACE CATEGORIZATION SYSTEMS & CLASSIFICATIONS

A main stage in my research design, in order to generate a classification system, is to explore existing type classification systems used today. There are different types of typographic classification systems, all of which serve and function in different roles. Classification systems are usually intended to narrow down a user's search space, and help in the process of font selection (Janbi & Suen, 2016). When thinking of the large variety of typefaces available, you can notice the need for such systems of help for designers and computer users in order to facilitate their choices. Typefaces can be classified according to different attributes, which include historical aspects, functions, and design characteristics (Dixon, 2008). In this chapter, I went through different types of classification systems in order to understand how they work, and what type of attributes they deal with. Adapting my work to the existing classification system is one of my research objectives. Classification systems included IBM Classification System, Panose Classification System (Latin, and Arabic), Catherine Dixon's Classification System, and font sources classifications (study how font source websites classify their typefaces).

5.1 IBM CLASSIFICATION SYSTEM

The IBM classification system is a font classification system used on computer software packages in order to provide users with typeface alternatives, and allowing users to select typefaces from the range that is available on operating systems. This system classifies fonts based on their visual appearances, therefore it does not identify typeface variation, type designer, supplier, or size. The classification system deals with two categories, which are the two digits that are given for each font in the system. These categories are Font Class (represented by first digit), and Font Sub-Class (represented by the second digit).

The classification system contains ten classes in total, each class contains up to fifteen digits, depending on the number of sub-classes each class has. Represented as 0-15, where 0 is used when the font has no classification, where 15 is used a miscellaneous sub-class for

fonts that are not covered by other subclasses (Doyle, 2005). The full IBM classification system presents 10 classes, along with their subclasses according to the font's visual appearances. Some subclasses are reserved for future IBM typefaces.

Refer to *"Appendix C : Typeface Categorization Systems & Classifications"*, for the full IBM classification system of 10 classes, along with their subclasses.

5.1.1 ADAPTIVE ATTRIBUTES OF IBM CLASSIFICATION SYSTEM

The IBM classification system covers writing systems beyond the commonly used Latin, which includes the Arabic writing system. Even though not pointed out in distinctive features, but Arabic typefaces can be classified in this system. As Janbi & Suen in their paper "Classifying Arabic Fonts Based on Design Characteristics: PANOSE-A" , referred to the IBM Nassim typeface to be classified in Class ID=2, Sub-class 2: Script.

After analyzing the IBM classification system, I have considered several attributes that I could adapt into my generated classification system. Such attributes include (Class attributes, such as Dates of emergence, and the common visual appearance), (Sub-class attributes, such as x-height, ascender height, descender height, tail characteristics, types of serifs, stroke weight contrast), and (Attributes that belong to classes of handwritten fonts, such as brush effect, anc connection of strokes). Table 5.1 in the end of this chapter shows the summarized attributes.

5.2 PANOSE-1 CLASSIFICATION SYSTEM (LATIN SYSTEM)

The Panose-1 system, is a type classification system that is used on computer softwares to classify, match, and suggest alternate typefaces based on the visual characteristics of the font. It is a system that relies on number codes that are potentially given to every font, according to its visual classification attributes. Panose was originally composed of 7-digits in 1991, however Panose-1 was an upgrade in the attributes, which deals with 10-digits (Bauermeister, 1987).

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The Panose-1 system has been used in several applications, of which is embedded into the operating system. As with the IBM classification system, it serves the same function of helping computer users and designers to sort fonts, compare characteristics, searching, grouping and substituting. As mentioned previously the system functions according to Panose digits that sorts typefaces according to their characteristics. The 10-digits represent visual or design characteristics. The first digit defines the font type family (which includes: Text, handwritten, decorative, and Pictorial), the rest represent classifications within the font itself. Such classes include (serif, weight, proportions, contrast, stroke variation, arm style, letterform, midline, x-height).

One special fact about Panose-1 is that it adapts itself to the font type family represented. Their characteristic classes adapt their attributes according to the type of font that is accorded to. For example, when the font type family is Latin Decorative, classification attributes include (class, weight, aspect, contrast,serif variant, treatment, lining and topology).

Refer to *"Appendix C : Typeface Categorization Systems & Classifications"*, for the full classification attributes to classify fonts, and an example on how classification takes place.

5.2.1 ADAPTIVE ATTRIBUTES OF PANOSE-1 SYSTEM

The PANOSE-1 system only works on classifying Latin typefaces. All classifictory attributes are designed to fit letterforms of the Latin Script. However through analyzing the system and how it works, I was able to extract features that would help me in generating my intended classification system. Table 5.1 in the end of this chapter shows the summarized attributes.

Focusing mainly on the Font type family 3: Latin Handwritten, with the attributes it accompanies would help me work for my approach, which is classifying typefaces by going back to their handwritten, and calligraphic origins.

"Latin Handwritten: D_1: Font Type Family , D_2: Tool Kind, D_3: Weight, D_4: Spacing, D_5: Aspect Ratio, D_6: Contrast, D_7: Topology, D_8: Form, D_9:Finials, D_10: X-Ascent" (See Appendix C, for full analysis of the font type family).

5.3 ARABIC PANOSE-A CLASSIFICATION SYSTEM (ARABIC SYSTEM)

Getting the chance to adapt attributes from the Latin Panose-1 system made me extend my research, and see if there has been existing work on Arabic Panose classification systems. I have luckily stumbled up a dissertation titled "Classifying Arabic Fonts Based on Design Characteristics: PANOSE-A" by Jehan Al Janbi, in which she explored the Panose-1 classification system, and created an extension for the Arabic script, and called it Panose-A.

The Panose-A classification system is based on the Naskh script. As mentioned in section 3.3.3 of chapter 3, the Naskh style is the most commonly used script in the Arab region, having clear, and simple letterforms, led it to be both the most written, and read in the Arab region.

Unlike the Panose-1, Panose-A encodes typefaces with 8-digits only. Each digit is used to classify a visual and design attribute of the font being classified. Digits are defined based on basic guidelines and measurements transcending the Arabic writing system, and other guidelines inspired from the writing system's calligraphic origins, these include (weight, end-style, contrast, bowl form, curve tail form, tooth height, loop height, and round stroke).

Refer to *"Appendix C : Typeface Categorization Systems & Classifications"* , for the full classification attributes to classify fonts, and an example on how classification takes place.

5.3.1 ADAPTIVE ATTRIBUTES OF PANOSE-A SYSTEM

The PANOSE-A is the most related classification model to my context, as it deals with attributes that are found in letterforms of the Arabic writing system. However, the classification is complex as it deals with algorithms and measurements that computers should deal with, rather than a user. I am mainly focusing on creating a system that could be read, and understood by designers, non-designers, Arabic speakers, and non-Arabic speakers.

Attributes that could be adapted into my work include: (weight classification, end-style classification, contrast classification, along with the bowl, tail and tooth characteristics classifications). Table 5.1 in the end of this chapter shows the summarized attributes.

5.4 CATHERINE DIXON'S CLASSIFICATION SYSTEM

This classification system was created as a framework to locate modern fonts into old existing classification systems. As old existing classification systems are strict to locate new experimental fonts, this framework tackles the strict font allocations. The classification describes western typefaces, and communicates in classification methods in an abstract manner so people who are familiar, and unfamiliar with type design could use it.

The framework functions through the usage of three main descriptive components which are (sources, formal attributes, and patterns).

Sources - describe the generic structural influences of the typeform, these structural influences were retrieved after analyzing categories of old existing classification systems, sources include (Handwritten, Roman, 19th century Vernacular, Decorated/ Pictorial, and an Additional source to maintain flexibility).

Formal attributes - these are basic individual units of description which refer to a typeface's design construction. This category contains eight attributes which include (construction, shape, proportion, modelling, weight, terminals, key characteristics, and decorations), each of these attributes have sub-attributes for description.

Patterns - are a result of recurrent configuration of sources and formal attributes. When formal attributes form a combination of sub-attributes describing a certain source a pattern is formed. Dixon works on representing these patterns chronologically in order to add a sense of understanding by presenting typefaces and patterns as history. The historical link towards representing patterns could help one form a link between sources and patterns, allowing one to assume formal attributes of certain typefaces.

Refer to *"Appendix C : Typeface Categorization Systems & Classifications"*, for a full list of formal attributes, along with the link between sources and patterns.

5.4.1 ADAPTIVE ATTRIBUTES OF CATHERINE DIXON'S SYSTEM

As previously mentioned, Dixon's framework is intended to be a flexible one, allowing classification of modern fonts that didn't fit into the more rigid earlier classifications. For my project, I wanted to focus mainly on the formal attributes category, as I wanted to analyze typographic structural details, rather than sources, and patterns. However both sources, and pattern categories are useful enough to understand Dixon's approach towards categorization. The sense of adding a historic attribute to her classification system resembles my approach. Another aspect that benefited my research here is the process of classification she has followed, which is the observation of past works, analyzing attributes, and adapting them into modern works. Table 5.1 in the end of this chapter shows the summarized attributes.

5.5 FONT SOURCES CLASSIFICATIONS

The last classification system I wanted to explore, and investigate how they work, are the systems font source websites use to classify their fonts for their users. As a designer, I am in constant search for a robust and intuitive collection of fonts that will boost my projects' uniqueness and font options. Therefore websites that offer fonts are a frequent destination, however I never understood how their categorization and filters happen to work when searching for font classifications within the website.

To understand how these websites operate, and classify their typefaces, I have carried out an investigation, and analyzed the classificatory attributes several websites follow in order to assign their collection of fonts. The three classification systems were (Adobe Fonts, Google Fonts, and 29LT), each carrying diverse amounts of typefaces, covering different languages, including Arabic.

5.5.1 ADOBE FONTS

Adobe Fonts is an online service provided by Adobe, which offers a subscription library of fonts. One can search for typefaces through searching an intended typeface, or use the sidebar of filters that follow a classification system of several attributes. Adobe Fonts offers a range of fonts that cover the Arabic Script. However, when using the sidebar filter in order to allocate typefaces, I have noticed that the classification system, and attributes do not fit the Arabic script. Filters are operated by a classification system that classifies typefaces according to attributes which include (Classification, Recommendation, and Properties).

Classification - the classification attribute defines structural properties that the set of characters in a single font share, this includes a collection of typefaces that are (Sans Serif, Serif, Slab Serif, Script, Blackletter, Mono, Handwritten, and Decorative).

Recommendation - the recommendation attribute refers to the use of the font, on where and how it can be used, the user can select one option to filter the usage, or view both. The section includes (paragraphs or headings).

Properties - this attribute defines appearance properties that are related to letterform proportions, and stroke characteristics. The section includes (weight, width, x-height, contrast, standard or caps only, default figure style). The user can select options of each property, for example the weight property has a low, medium and bold.

"Appendix C : Typeface Categorization Systems & Classifications" , to see the list of attributes fonts are classified in Adobe Fonts, along is mentioned the applicability of the classfactory properties on the Arabic Script.

5.5.2 GOOGLE FONTS

Google Fonts is a service provided by Google, which is an online website that offers a collection of open source designer webfonts. The website works as a font catalog, where the user could view, test, select and pair fonts, and download them for immediate usage. Google Fonts is one of the few platforms that offer open source fonts that cover the Arabic Script. Just like Adobe Fonts, to help users allocate their font options a filter sidebar is offered, where fonts are classified according to the users needs. Filters are operated by a classification system that classifies typefaces according to attributes which include (Categories, language, and font properties).

Categories - this attribute defines structural properties that the set of characters in a single font shares, these include (serif, san serif, display, handwriting, and monospace).

Language - this attribute allows the user to locate their intended fonts that only cover a certain language and script. Google Fonts cover over 28-languages which include (Latin, Arabic, Thair, Chinese, .. etc).

Font Properties - this attribute defines appearance properties that are related to letterform proportions, and stroke characteristics, which include (number of styles -which includes weight variants-, stroke thickness, slant, and width).

Refer to *"Appendix C : Typeface Categorization Systems & Classifications"* , to see the list of attributes fonts are classified in Adobe Fonts, along is mentioned the applicability of the classfactory properties on the Arabic Script.

5.5.3 29 LT

29LT is an online service designed to offer designs of retail, and bespoke multiscript type designs. It caters to global societies, and are experts in the production of typefaces that cover the Arabic and Latin writing systems, along with their accompanied languages. 29LT (as 29-letters) is named after the number of the Arabic language alpha-

bets, as the name serves their main purpose of creating a different approach of Arabic typography. Unlike the previously mentioned examples, this website offers great importance in categorizing fonts to both scripts being used, serving properties and characteristics that serve both Arabic and Latin letterforms.

Fonts on the website are categorized by a classification system that classifies typefaces according to attributes which include (Category, Proportions, Style, Use and Format).

Category - This attribute defines structural properties that the set of characters in single font share, this includes, the category is divided into two scripts, covering both the Latin and Arabic script. The Latin includes (sans serif, serif, slab serif, and script), however the Arabic includes (geometric, humanist, cursive and freehand).

Proportions - this attribute identifies properties related to letter dimensions, and their relation with the space around it. The attribute includes the width description (monospaced, condensed, semi-condensed, normal, semi-wide, wide), and stroke contrast (monolinear, low contrast, high contrast).

Style - this attribute identifies the overall look a font has, and the effect it gives to the perceiver. Style could be helpful when choosing a context-related font. Options include (clean, classic, corporate, experimental, economic, graceful, informal)

Use - this attribute refers to "how" the font will be used, as in function, which is also related and dependent on the form classifications. Use attributes include (display, titles, body text, small text)

Format - this attribute refers to "where" the font will be used, as in context. Which correlates with both form classifications and the Use attribute. Format attributes include (advertising, branding, infographic,publication,screen platforms, and wayfinding).

Refer to *"Appendix C : Typeface Categorization Systems & Classifications"*, to see the list of attributes fonts are classified in Adobe Fonts, along is mentioned the applicability of the classfactory properties on the Arabic Script.

5.6 ADAPTIVE ATTRIBUTES SUMMARIZED

This section presents the adaptive attributes of all resources I have explored in my research phase. Resources include existing font categorization systems, interviews and secondary literature, and font sources. Table 5.1 represents all these attributes, and how can I use them in identifying attributes in Arabic Script.

TABLE 5.1

Classificatory Adaptive Attributes. A list of adaptive classification attributes that could be used for the generated classification system. Attributes are taken from existing classification systems, interviews and secondary literature.

Content Source (Classification Systems/ Interviews/ Literature Research)	Adaptive Attributes	Usage in Arabic Script
IBM Classification	Dates of Emergence and common visual appearance are key attributes to identify a class.	6-calligraphic scribal styles emerged in different dates, each of the dates shared certain attributes.
	Attributes within sub-classes: (x-height, ascender height, descender height, tail characteristics, types of serifs, stroke weight contrast).	Such attributes could be used in arabic y-axis guidelines and anatomic attributes.
	CLASS ID = Scripts Brush effect attribute	Referring to a tool which is used in creating strokes, reed pen angle, nib head characteristics.
Panose -1 Classification	Latin Handwritten Category: (tool kind, stroke weight, stroke contrast, and finials).	Referring to a tool which is used in creating strokes, reed pen angle, nib head characteristics. Alef thickness could define stroke.
Panose – A Classification	Stroke Attributes: (weight, end of style, stroke thickness contrast).	Same adaptation as Panose-1 classification.
	Letterform Attributes: (bowl form, tail curve, and tooth height)	Already design for Arabic letterforms
Catherin Dixon's Classification	Construction Attributes: stroke formation	Alef thickness could define stroke and curved letters define contrast
	Shape Attributes: letterform traits (anatomic elements, cross-bar position, curve shape).	Such attributes could be used in arabic anatomy.
	Proportions: (letter width, relative internal proportions , and y-axis guidelines).	Such attributes could be used in arabic y-axis guidelines.
	Modelling: (stroke contrast, axis of contrast).	Deals with the structure of script, and angle of writing
	Terminals: (baseline, ascender, descender)	Nib head affecting stroke beginnings, endings, and dot shape

Adobe Fonts (font source)	Recommendation Attributes: (paragraph, headings)	Referral on the context of which script can be used in
	Properties Attributes : (stroke weight, stroke contrast)	Alef thickness could define stroke and curved letters define contrast.
Google Fonts (font source)	Font Properties Attribute	Speed and direction of writing
	Slanted verticals	
29LT	Categories for Arabic Typefaces: (geometric, humanist, and cursive)	Source of emergence or inspiration
	Proportions: (character width, and stroke contrast)	Alif thickness could define stroke Curved letters define contrast
		Such attributes could be used in arabic anatomic attributes
	Use: (display, titles, body text, small text)	Referral on the context of which script can be used in.
	Format: (advertising, branding, infographic, publication, screen platform, wayfinding).	Referral on the platform of which script can be used in.
Interviews & Secondary literature (from Chapter 3, and 4)	Dots and diacritic variability	
	Use of ligatures	
	Dots relativity to shape	
	Character differentiation with similar basic shapes	
	Connectivity (glyphs, ligatures, speed of writing)	
	Glyphs (character variability)	

6 | CATEGORIZATION STAGE DATA PROCESSING & DESIGN

6.1 DATA PROCESSING & DESIGN

This chapter represents the design process which I went through in order to generate an Arabic Type Classification system, based on attributes related to Arabic script. My design process was based on three main stages, which were: qualitative data collection stage (from literature research, subject matter expert interviews, and qualitative observation), qualitative analysis stage (which was two stages of clustering); attributes from classification systems, and attributes from Al-Aqlam-al-Sitta), and implementation stage (which were merging and grouping analyzed clustered attributes, into one classification system).

6.2 QUALITATIVE DATA COLLECTION STAGE

My first stage of qualitative data collection relied on three methods, which were literature review, subject matter-expert interviews and qualitative observation. Each of these methods helped me in collecting the needed information for me to construct a pathway in generating an Arabic Type Classification System.

- -

6.2.1 LITERATURE REVIEW

Through the aid of primary and secondary literature I was able to cover the ground basis of my outcome. This included:

1. Analyzing characteristics and attributes of the 6-calligraphic scribal style. These include visual structural, and contextual attributes of the styles, known as Al-Aqlam-al-Sitta, along with their forms and functions through history.

(Covered in Chapter 3: In the Alley of History)

2. Knowing calligraphic elements to be considered when designing Arabic typefaces . Some elements produced by the hand, are still difficult to produce by computer tools when designing Arabic typefaces. Taking these elements into consideration optimize the imitation of human-hand-movement, providing more effect into Arabic typefaces. These elements include: connectivity enhancers such as a variety of glyphs and ligatures, toothy spikes along letters, variation of dots and diacritics, reed pen replacement tools, and y-axis guideline fluidity.

(Covered in Chapter 3: In the Alley of History, and Chapter 4: Cognitive Linguistics, Image Schemas & Embodiment)

3. Adapting approaches, characteristics, and attributes into the type classification system. Going through different classification systems opened up a new lens on how these systems are constructed from scratch. Although IBM, PANOSE-1, and PANOSE-A are computer operated classification systems, their process of construction, approach, and the type of attributes they focus on was helpful to me. Catherine Dixon's classification system was the most inspiring, as her outcome, was somehow related to what I wanted to generate. Adapting attributes of these systems to the Arabic writing system was a challenge, however, ground guidelines from previous chapters helped.

(Covered in Chapter 5: Typeface Categorization Systems & Classifications)

6.2.2 SUBJECT MATTER-EXPERTS INTERVIEWS

1. Visiting Amman, Jordan in the Arab region, was an enriching aspect on how my research has evolved. As planned during my visit, I got to interview calligraphers, and typographers, in order to have a wider perspective on the problem the Arabic writing system faces today, in both the scribal and type industry.

Interviewing calligraphers made me understand the essence of the hand-movement, reed pen, and paper surfaces on Arabic calligraphy, along with learning different Arabic script ground rules of Ibn Muqla, Ibn-al-Bawwab, and Yaqut-al-Mutasimi, which I have covered in Chapter 3.

In addition to that, calligraphers also share anatomical terminologies which are used in the Arabic script (terms include, eye, bowl, tail, and stem).

(Covered in Chapter 3: In the Alley of History, and Chapter 4: Cognitive Linguistics, Image Schemas & Embodiment)

2. Typographers, and graphic designers however shared their experience in designing contemporary Arabic typefaces . Discussing the urge of going back to historical fonts as guidelines, was the inspiration for me to create a contemporary typeface categorization system based on basic scribal styles transcending from the original Arabic script.

(Covered in Chapter 3: In the Alley of History, and Chapter 5: Typeface Categorization Systems & Classifications)

6.2.3 QUALITATIVE OBSERVATION

This stage was carried out twice in my implementation process, first-ly while constructing the classification system, and secondly while testing it on contemporary Arabic typeface, observing classificatory attributes of the 6-calligraphic scribal style, in order to construct the classification system.

1. My literature research did help me cover visual, structural and contextual attributes of the 6-calligraphic-scribal styles. However, during my analysis, I have noted some styles had attributes noted and others did not. Therefore I referred to some qualitative obser-vations in order to study the missing attributes in certain scripts, in order to fill in the gaps.

For example, my literature sources had vague information about the Kufic script. As some scripts had the existence/absence of slants men-tioned in their visual attributes, the Kufic resources did not. Therefore I referred to my own observation by looking into different Kufic styles to determine the existence of a slant.

2. Testing if my classification system could work on contemporary fonts required trying to categorize Arabic fonts into it. The process of

categorization, led me to dissect the typeface in order to understand its visual, structural, and contextual attributes, along with anatomic elements. An example is provided in the next chapter, where the outcome is described.

6.3 QUALITATIVE ANALYSIS STAGE

Retrieving the attributes from the previous section of qualitative observation and data collection, was followed by categorizing the information to form a single system. The categorization of information was divided into two stages:

6.3.1 FORMING CLASSIFICATORY ATTRIBUTES OF AL-AQLAM-AL-SITTA

Through clustering visual, structural, and contextual attributes of the 6-calligraphic-scribal styles in Chapter 3 – Section 3.3 , attributes were created. Below are the attributes that were clustered. Note: the attributes section was more of a build up, where every script needed new attributes to be added to, gaps were filled through qualitative observation this is shown in figure 6.1.

(Derivative of Script, Context, Proportional Attributes, Stroke Weight, Structural Details, Kashida Usage, Slant, Style, Closed Shapes, Tool Angle, Writing Speed, Stroke Contrast, Range of Characters, Letter Spacing, Letter Clarity, and Harmony)

FIGURE 6.1

Attributes of Al-Aqlam-al-Sitta. Shows how attributes of the scribal styles were built, dots indicate attributes covered from literature research, empty squares indicate attributes to indicate the qualitative observation of scripts.

	Derivative of Script	Context	Proportional Attributes	Stroke Weight	Structural Details	Slant	Style	Tool Angle	Writing Speed	Stroke Contrast	Range of Characters	Letter Clarity	Harmony
Kufic Script	●	●	●	●			●			●	●	●	
Thuluth Script	●	●	●	●	●		●	●	●	●	●		●
Naskh Script	●	●	●		●				●	●		●	
Reqqa Script		●	●	●	●	●			●			●	●
Diwani Script		●	●	●	●	●	●		●	●	●	●	●
Nasta'liq Script	●	●		●	●	●	●		●		●	●	●

6.3.2 CLUSTERING ATTRIBUTES FROM CLASSIFICATION SYSTEMS

Clustering classificatory attributes, classes and categories from the existing classification systems was the first step of creating the outcome. Three levels of clustering took place, first to determine attributes, second to determine categories, and third to determine classes. Below is an example of how attributes were clustered in three stages.

....

6.3.2.1 LEVEL ONE CLUSTERING

Figure 6.3, shows how I carried out the first level of clustering, which required collecting inspired attributes from existing categorization systems, and secondary literature. Note that I used different colors so it could help me in categorizing data in the next stages. These adaptive attributes are previously mentioned in table 5.1 in the previous chapter.

FIGURE 6.2

Level One of Clustering. The first stage of data clustering. Different sources are displayed of which I have collected adaptive attributes that would match my generated classification system. Color coding refers to the different sources I have used.

IBM CLASSIFICATION	PANOSE -1 CLASSIFICATION	PANOSE -A CLASSIFICATION	CATHERINE DIXON	FONT SOURCES CLASSIFICATION	SECONDARY LITERATURE
emergence date	tool kind	stroke weight	construction	context of Use	dots & diacritics
x-height	stroke weight	stroke contrast	terminals	typeface source	use of ligatures
ascender height	stroke contrast	stroke end of style	stroke contrast	format of usage	dots relativity
descender height	range of characters	bowl form	axis of contrast	slanted verticals	character differentiation
tail characteristics	finials	tail curve	letter width	stroke weight	connectivity
types of serifs		tooth height	letter proportions	stroke contrast	glyphs
stroke weight			y-axis guidelines	character width	speed of writing
stroke contrast			curve shape		
brush effect					

6.3.2.2 LEVEL TWO CLUSTERING

Organizing previously listed attributes into common categories, through finding patterns and clustering of elements. Figure 6.3 shows how the second level of clustering took place. Note that color codes are from the previous stage.

FIGURE 6.3

Level Two of Clustering. The second level of data clustering, where I categorized related attributes together.Color coding here refers to the different sources I have used.

CONSTRUCTION & USAGE	STRUCTURAL DETAILS	WEIGHT & STROKE ATTRITBUTES	VERTICAL & PROPORTIONAL GUIDELINES	RANGE OF CHARACTERS	HANDMOVEMENT ATTRIBUTES
emergence date	tail characteristics	stroke weight	ascender height	dots & diacritics	slanted verticals
context of Use	bowl form	stroke contrast	descender height	use of ligatures	speed of writing
typeface source	tail curve	stroke end of style	tooth height	glyphs	axis of contrast
format of usage	tooth height	terminals	letter width		
	dots relativity	finials	letter proportions		
	character differentiation		character width		

Clustering previously listed attributes resulted in the formation of patterns, I was able to create categories. As a second level of categorization, here I was able to cluster elements into six categories which are (construction & usage, structural details, weight & stroke attributes, vertical & proportional guidelines, range of characters, hand movement attributes), each of these attributes will be explained in detail in the next chapter.

You will notice that there are some redundancies in the attributes of a single category.These redundancies will be minimized in the next level of clustering.

···

6.3.2.3 LEVEL THREE CLUSTERING

The third level of clustering was to organize the resulting categories into three main classes. Using a taxonomic approach in my categorization system is what I have learnt from the existing classification systems I have studied, and analyzed. Therefore in this stage, I took the six categories and organized them into three main classes.

Classes were (construction and usage, anatomic attributes, and connectivity and harmony). Figure 6.4 shows how classes, categories, and attributes are organized, after minimizing redundant attributes and simplifying terminologies.

FIGURE 6.4

Level Three of Clustering. The third level of data clustering, where I organized similar categories into three main classes (construction & usage, anatomic attributes, connectivity & harmony).

CLASSIFICATION 01 CONSTRUCTION & USAGE		CLASSIFICATION 02 ANATOMIC ATTRIBUTES				CLASSIFICATION 03 CONNECTIVITY & HARMONY
CONSTRUCTION & USAGE	**STRUCTURAL DETAILS**	**WEIGHT & STROKE ATTRITBUTES**	**VERTICAL & PROPORTIONAL GUIDELINES**	**RANGE OF CHARACTERS**		**HANDMOVEMENT ATTRIBUTES**
typeface source	dots relativity	stroke thickness	ascender height	dots & diacritics		slanted verticals
context of use	character differentiation	stroke beginning	descender height	use of ligatures		speed of writing
format of usage	bowl form	stroke ending	tooth height	glyphs		axis of contrast
			letter width			
			letter proportions			

As one can notice, I have minimized the attributes within a single category due to their redundancy of the attributes, or its inapplicability to classify Arabic typefaces, and scripts. Attributes included (date of emergence, tail characteristics, tooth characteristics, curve characteristics, stroke contrast, weight, terminals, and finials).

Date of emergence - would be easy when classifying the 6-calligraphic scribal styles, however, when classifying typefaces, dates of creation and design would not really affect influences of letter structure, typographic units, or visual appearances.

Tail, tooth and curve characteristics - are applicable on Arabic scripts, however, going deep into classifying typefaces in Arabic would leave the typeface as unclassified. Therefore such elements are integrated within stroke properties, and anatomic attributes.

Stroke contrast & weight - although both elements were the most redundant within classification systems, I focused on combining both elements together into stroke thickness, as such attribute relies on the tool being used (more applicable to calligraphic typefaces).

Terminals, and finials - were neither replaced, nor removed from the attributes. I just renamed this attribute to stroke beginning and stroke ending. This way one can relate when dealing with calligraphic based typefaces.

6.3.3 MERGING ATTRIBUTES TO FORM AN OUTCOME

This stage is the final stage of forming the outcome, which is combining the attributes retrieved from both classified attributes *(Al-Aqlam-Sitta in section 6.3.1, and the generated classification system in section 6.3.2)*. This final stage was done in order to integrate Arabic script attributes, such as influences of letter structure, typographic units, and visual appearances. Figure 6.5 on the next page shows the final outcome, boxes in blue show the integrated attributes of the Arabic script.

CLASSIFICATION 01
CONSTRUCTION & USAGE

CLASSIFICATION 02
ANATOMIC ATTRIBUTES

CLASSIFICATION 03
CONNECTIVITY & HARMONY

CONSTRUCTION & USAGE	STRUCTURAL DETAILS	WEIGHT & STROKE ATTRITBUTES	VERTICAL & PROPORTIONAL GUIDELINES	RANGE OF CHARACTERS	HANDMOVEMENT ATTRIBUTES
typeface source	dots relativity	stroke thickness	ascender height	dots & diacritics	slanted verticals
context of use	character differentiation	stroke beginning	descender height	use of ligatures	speed of writing
format of usage	bowl form	stroke ending	tooth height	glyphs	axis of contrast
	character complexity		letter width		
	closed shapes		letter proportions		
	letter clarity & legibility		baseline fluidity		
	kashida usage		stem height variability		
			dots & diacritic fluidity		

FIGURE 6.5

Merged Attributes. The final outcome of the generated outcome, after merging Al-Aqlam-Al-Sitta attributes, along with the classification attributes.

7 | OUTCOME - AN ORIGIN BASED CLASSIFICATION SYSTEM

7.1 INTRODUCING CLASSIFICATIONS

After all the stages went through, from qualitative research and observation, along with the qualitative data clustering and analysis, the implementation stage resulted in the generation of the outcome of this research. The outcome which will be explained in this chapter is a typeface classification system, which links the ground rules of calligraphic scripts, structural influences of Arabic letterforms, and see how this system adapts into existing contemporary typefaces used today.

The classificatory system consists of three classes, which are construction & usage, anatomic attributes, and connectivity & harmony. Each of these classes contain categories which foster different attributes which will be further discussed along the chapter.

- -

7.1.1 CLASSIFICATION 01 – CONSTRUCTION & USAGE

Construction and Usage names the first class within the system. Just like its name, this class refers to the construction of the script, or typeface, which goes back to the skeleton of the typeface, and how its guidelines were formed. When designing or choosing a typeface, one way of achieving the form and function rule is by deciding the guidelines, and grids of which the letter forms will be formed upon. Therefore I chose this class to be the first as it guides users right from the start in choosing their source, context, and format of use.

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7.1.1.1 SOURCE OF EMERGENCE

This category focuses on the structural basis of the script or typeface. Meaning where it was sourced from. Contemporary Arabic typefaces vary in their sources today. They are either calligraphic based (following arabic calligraphic guidelines), Latin based (following Latin

typographic guidelines), or freehand (which is usually hand-drawn and is concept based).

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7.1.1.2 CONTEXT OF USE

This category, inspired by 29LT's categorization system and the ***Ottoman Script Systemization in Chapter 3***, focuses on the context of which the script, or typeface is used in. This includes typefaces used in titles, headings, body texts, and small texts.

....

7.1.1.3 FORMAT OF USE

Adding the application aspect onto the classification system would assist designers relate what typefaces to use not only in specific contexts, but also specific formats. This category allows typefaces and scripts to be categorized according to the formats which they could be used in, which includes advertisements, branding, signage systems, or on screen platforms.

7.1.2 CLASSIFICATION 02 - ANATOMIC ATTRIBUTES

Focusing on the structural influences of Arabic letterforms, and typographic units, this class introduces different anatomic elements which provide distinctive visual attributes to the script or typeface. The class includes categories such as structural details, weight & strokes attributes, vertical & proportional guidelines, and range of characters within a script or typeface.

....

7.1.2.1 STRUCTURAL DETAILS

This category describes several structural attributes of the Arabic letterform within a script or typeface. These attributes include (character complexity, character differentiation, dots relativity & shape, closed shapes, bowl form, letter clarity & legibility, kashida usage).

Character Complexity – (High, Moderate, Low)

Character complexity refers to how complex the character is constructed. In Arabic script, character complexity of a script could be due to the stroke thickness contrast, or anatomic proportions. Complexity of the character attribute is measured as high, moderate, or low.

In the example seen in figure 7.1, you can notice that the letter labelled as high complexity has a stroke beginning that is complex to form, weight contrast that is high along the letter, and proportions that do not follow certain guidelines. While the letter is labelled as moderate, the stroke is tool based, weight contrast is moderate, and guidelines are followed by Ibn Muqla's rule of dots *(mentioned in section 3.1.2 of Chapter 3)*. Low complexity letter, has a constant weight, and proportions used are latin based.

Character Complexity. Shows three different levels of character complexity. Represented with the letter "ain", different typefaces are used to show the letter in high complexity, moderate and low.

high   *moderate*   *low*

Character Differentiation – (High, Moderate, Low)

Some Arabic letters share some sorts of similar structures, which are differentiated by dots, or stems *(which are the basic letterform discussed in section 2.2.1 of Chapter 2).* Some scripts go far beyond adding only dots, and stems, adding more details. One of the common letters that share resembling structures are (faa, qaaf, and taa, saad) . Character differentiation attribute is measured as high, moderate, or low.

Character Differentiation.
Shows three different levels of character differentiation of letters sharing the same basic letterforms, different typefaces differentiate these letters in different levels, which are labeled here as high, moderate and low.

high   *moderate*   *low*
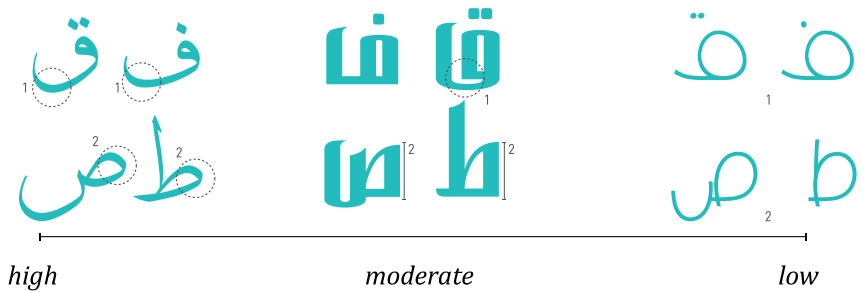
In the example in figure 7.2, notice the characters with high differentiation have structural differences in tail depth and eye opening, whereas the moderate has some structural details, such as the tail. The low, only uses the dots for differentiation.

Dots Relativity & Shape – (Rhombus, square, and circle)
Dots are an essential part of the letter structure. In some scripts dots are used to maintain letter proportion, and others are only for differentiating letters sharing the same structural forms, like the example in figure 7.2. Shapes of the dot either depend on the tool's nib head used, or randomly shaped, shapes include rhombus, square, or circle. Figure 7.3 shows different ways a dot could be represented.

Dots Relativity & Shape. Shows examples of how dots are used on Arabic letters, as seen there are three shapes, which are the rhombus, square and circle. Circles can be added to curved strokes, or angular, each representing different scribal style.

rhombus   *square*   *circle*   *circle*
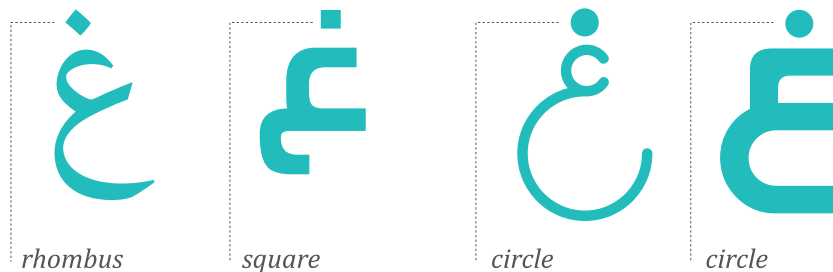
Notice in the examples in figure 7.3: the dots have two classifications, their shape, and how they relate to the letter proportion and structure. For example, the rhombus is formed by the head of the nib, and the dot size is relative to the letter proportion if following Ibn Muqla's dots system of proportions. On the other hand, the third example, the dot is larger than the stroke thickness of the overall glyph, and the dot size does not follow a rule of relativity.

Closed Shapes – (exists, do not exist)
Some Arabic letters have a hollow area which is called (eye). In some scripts these hollow shapes are closed, whereas others are left opened all depending on the stroke thickness, and the tool used. Letters include (waaw, meem, ending form of ain, and ghain). Figure 7.4 in the next page shows examples of this attribute.

FIGURE 7.4

Closed Shapes. Shows examples on how some eye-structures can be closed, and others can be opened, depending on stroke thickness of which the original calligraphic script.

غ ع م و
(ghain)   *(ain)*   *(meem)*   *(waaw)*

غفغخ غ   ععع ع   ممم م   و و
(ghain)   *(ain)*   *(meem)*   *(waaw)*

و م ع غ

غفخغ غ   عزع ع   ممم م   و و

Bowl Form – (Circular, angular, curved, half circle, flat depressed)

Some letters in Arabic have a bowl in their anatomy, usually found below the baseline as a descender. Different scripts and typefaces treat bowls differently according to proportions, stroke movements and guidelines. Figure 7.5 shows examples of bowl shapes within the Arabic letterforms and structures.

FIGURE 7.5

Bowl Forms. Shows examples of bowl shapes within the Arabic letterforms, and structures. Notice the words used to describe the bowls are relative to the baseline.

ن غ ل   *baseline*
curved bowl

ن خ ل   *baseline*
circular bowl

ن غ ل   *baseline*
flat & depressed bowl

ن خ ل   *baseline*
angular bowl
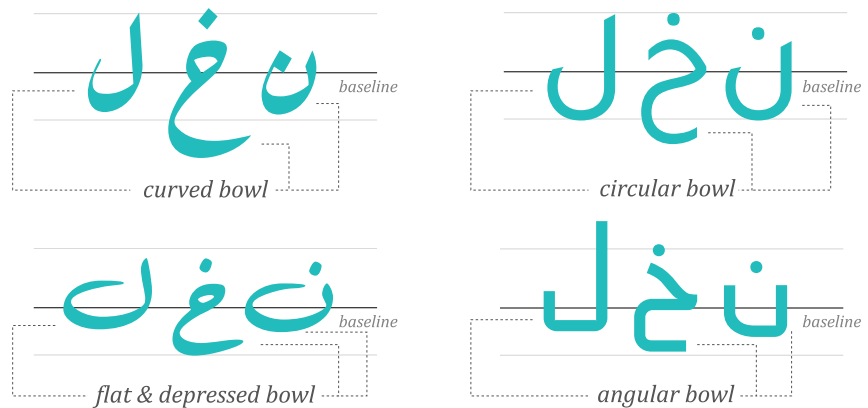
Letter Clarity and Legibility – (High, Moderate, Low)

Different scripts have different functions. Some are made for great readability and legibility, which requires letters to be clear. Others are made for the sake of decoration and display, which requires letters to have a certain aesthetic effect rather than clear. An example in figure 7.6 is shown on the next page.

high   *moderate*   *low*

In the examples shown in figure 7.6, the typeface labelled as high has all its letters clearly read, as their anatomic attributes are fully visible. In the moderate example, its letters are clearly read, but some letters are written with basic strokes. The low example is a freehand-based font, letters are not clear enough, as the typeface is concept based, therefore anatomic guidelines may resemble the concept, more than the language of the writing system.

Kashida Usage – (applicable, not applicable)
Just like kerning in Latin script, the Kashida is what creates spaces between letters in Arabic, while maintaining the cursivity. Some scripts in Arabic, require these spaces, whereas other script's aim for their letters and words to take less space, the importance of the Kashida is explained in *section 2.2.2 of Chapter 2*.

FIGURE 7.7

Kashida Usage. Shows an example on how Kashidas could be used in certain script styles, and typefaces, and how they could be out of context if misused in scripts that do not require Kashidas.

kashida can be applied   *kashida can't be applied*

In the first example of figure 7.7, the typeface is derived from a Naskh script, which is made for books and copies, therefore Kashidas can be applied in such a style, to achieve justification and needed letter spacing. However in the second example the Kashida is not in favor, since it is a Reqqa derived typeface, meaning it is a fast written script, therefore calligraphers, and scribers, need to find the shortest and fastest way to write, hence adjusting their baseline as well.

7.1.2.2 WEIGHT & STROKES ATTRIBUTES

This category describes attributes related to the stroke of the letter structure. Stroke attributes play a major role for calligraphic-based typefaces, as they represent the characteristics of tools that were used in calligraphic practices. This category includes the major attributes, which are (stroke thickness, stroke contrast, stroke beginning and ending).

Stroke Thickness & Contrast – (Thick stroked script , thin stroked script)
Like people, some scripts are thick boned, and others are thin. Depending on the tool being used to create the script, the thickness and the contrast of the stroke is formed. Thick stroked scripts can exist in different weights, however, the skeleton of the scripts or (thickness of the tool used) is thick by itself. Thin stroked scripts on the other hand have finer stokes. Examples are shown in figure 7.8.

FIGURE 7.8

Stroke Thickness. Shows examples of two different scripts, the Kufi, and Thuluth, where one represents a thick stroked script, and the other represents a thin stroked script.

thick stroked script | *thin stroked script*

A second attribute to bear in mind when dealing with strokes is the stroke contrast. The contrast is the difference between the thickest and thinnest areas of a single stroke. Because Arabic letterforms are majorly curved, contrast is highly important. Examples are shown in figure 7.9.

FIGURE 7.9

Stroke Contrast. Representing different examples of stroke contrasts within a single letter. Contrast can be levelled as high, medium and low.
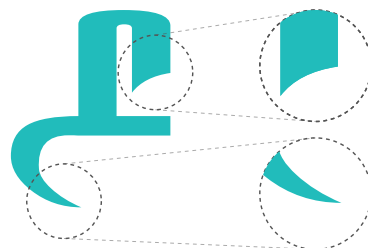
high contrast in stroke, due to tool used. | *low contrast in stroke, due to tool used.*
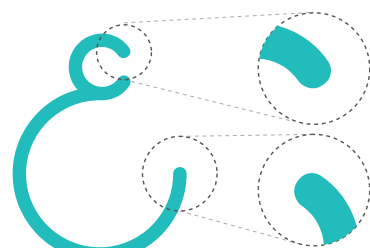
Stroke beginning & Ending – (rounded, diagonally trimmed, horizontally)

Strokes are usually affected by the tools that create them. In Arabic, scripts have stroke beginnings that would sometimes differ from their ending. The beginning is usually affected by the tool, whereas the ending is affected by the writer's hand movement. Figure 7.10 shows different examples of both stroke beginning, and endings. Note that the arrangement in the example could differ, beginnings do not always have the same complementary ending as shown.

beginnings

| rounded | diagonally Trimmed | horizontally Trimmed | pointed |

endings
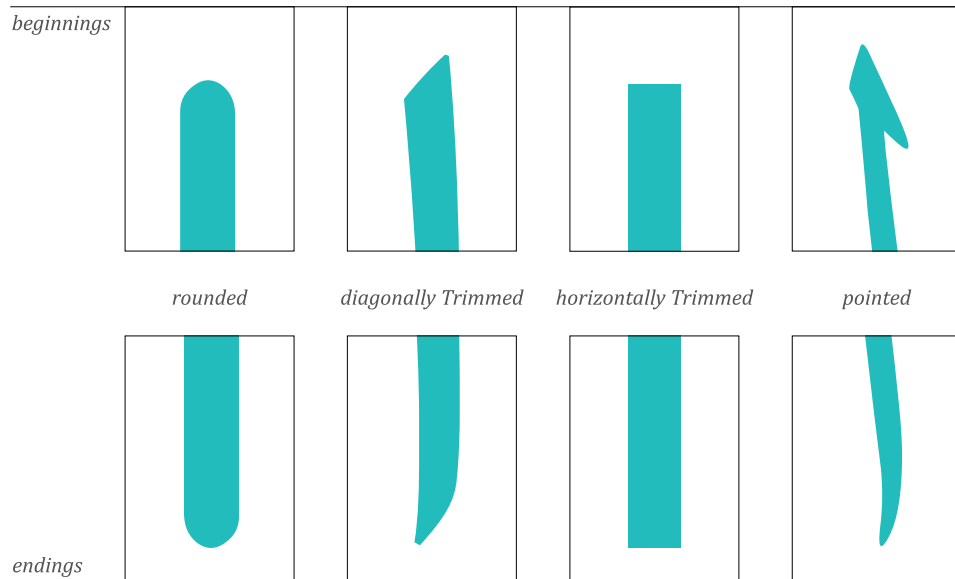
7.1.2.3 VERTICAL & PROPORTIONAL GUIDELINES

This category describes attributes related to proportional measurements and guidelines. ***In section 2.2.3 of Chapter 2, and section 3.1.2 in Chapter 3***, we went through different possible ways the Arabic script could maintain its guidelines and proportions. This category dissects these different ways, into attributes within the script or typefaces. These include baseline fluidity, stem height, ascender height, descender height, tooth height, loop height, character widths and position of dots and diacritics relative to letters. Figure 7.11 shows an example of Naskh script placed on y-axis guidelines, each guideline is identified along with the script itself.

However, to indicate the effect of these guidelines and proportions have on the Arabic writing system, especially when it comes to calligraphic and scribal writings, I have focused these guidelines into two main attributes, which are the fluidity in guidelines, and position of dots and diacritics.

حرفُ الضّادِ يجمَعُنا

ascender + stem height
x- height
tooth height
baseline
descender

Guideline Fluidity

As mentioned previously, in Arabic, guidelines tend to be more dynamic to foster different letter and word forms. Unlike Latin having a baseline, x-height, ascender, and descender, Arabic guidelines can add up to twelve, in order to achieve fluidity, this is why I have enriched my knowledge in type anatomy *(in section 2.2.3 of Chapter 2)* before starting my qualitative observation, because each part of the letterform could have a guideline within the y-axis set of guidelines.

tooth height 2
stem position 1
ascender 3
ascender 2
ascender 1
baseline 3
baseline 1
descender 1
descender 2
stem position 2
tooth height 1
baseline 2
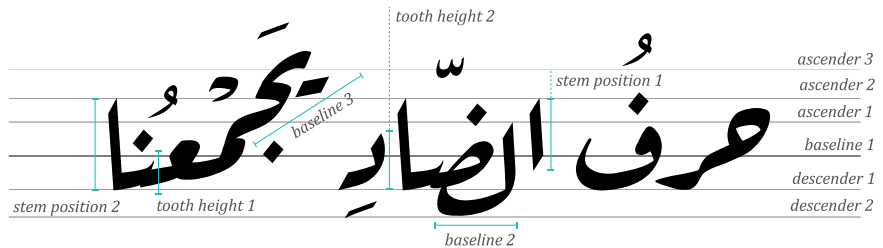
Dots & Diacritic Position Fluidity

The previous example in figure 7.12 shows how guidelines can be dynamic when it comes to Arabic. This flexibility in the guidelines gives the script its aesthetic beauty, ease the reading flow, or allow it to consume less space per line. The fluidity in the position of dots and diacritics is also something that gives the script its Arabic identity. As mentioned in *section 2.2.1 of Chapter 2*, Arabic dots and diacritic positions should be treated as individual treatment per letterform. However in type design, typographers try to position diacritics in the most possibly used position, relative to the majority of letters.

7.1.2.4 RANGE OF CHARACTERS

This category shares attributes on the range of characters the typeface can cover. There are two achievements a typeface could have when it has a high range of characters, which are being able to cover more than one Arabic-script-using language, and imitate the effect of handwriting as much as possible by the existence of diverse glyphs and ligatures. Attributes here include, glyph variability, dots variability, diacritic variability, and ligature variability.

Glyph Variability – (high, low)
To maintain the Arabic script's cursive, some Arabic letters have more than one glyph (form) to adapt into words properly. Glyphs include isolated, beginning, medial, and ending. In addition to these four main glyphs, some scripts require more glyphs to adapt into the script's style and identity. ***See section 2.2.2 in Chapter 2***.

FIGURE 7.13

Glyph Variability. An example using the letter (meem) two different scripts, notice the usage of the letter in different positions, and the variability of glyphs.

isolated
glyph

isolated
glyph

ending
glyph

medial
glyph

beginning
glyph

ending
glyph 2

ending
glyph 1

medial
glyph

beginning
glyph
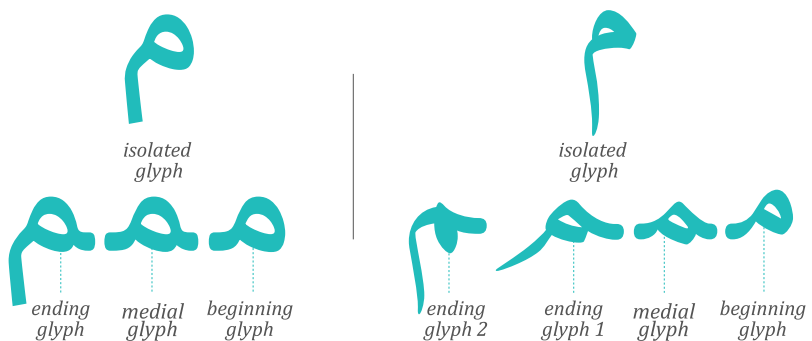
Dots Variability – (high, low)
In the Arabic script certain letter shapes can represent more than one consonant. After the spread of Arabic, dots (nuqat) were made to distinguish between these consonants, for non-Arabic speakers. Today the Arabic script covers more languages, and therefore more dots are being used on letter shapes to cover consonants of these languages.

Examples include: Urdu, Jawi, Uyghur, Punjabi, Persian

Diacritic Variability – (high, low)

Vocalization is a main property in the Arabic language. Just like the dots, diacritics (tashkil) were created to help non-Arabic speakers to vocalize and understand the Arabic language. Being a script that covers more languages, diacritics are used today to cover more of these languages.

Ligature Variability – (high, low)

One of the most distinctive characteristics of the Arabic script is its high precision in connectivity. Letters can be connected to one another in different ways to achieve high connectivity, dynamic or aesthetic decoration. To do so ligatures of letters should be created. *See section 2.2.2 in Chapter 2*

(2) (1)   (heh) (tashkil) (laam) (laam)   (2) (1)   (meem) (alif) (hamze)

(2) (1)   (daal) (meem) (ha'a) (meem)   (2) (1)   (meem) (laam)

7.1.3 CLASSIFICATION 03 – CONNECTIVITY & HARMONY

This class refers to the effect of handwriting on the script. Hand movement gives the script a certain look and feel, which affects the message to be conveyed and the context of which the typeface will be used in. This includes slants, axis of stroke contrast, and writing speed and cursivity.

7.1.3.1 HAND MOVEMENT ATTRIBUTES

Slant, Writing Speed, & Cursivity

The three factors are all dependent on one another. Slants are usually caused in fast handwritten fonts. The movement of the hand causes both vertical and horizontal slants. Cursivity also indicates the speed of writing, along with the usage of the written piece.

Axis of contrast

Stroke contrasts a recognizable attribute in scripts. Back to the hand movement while writing a direction in the contrast is formed, which results in a slant or just an illusionary pattern in the contrast in a writing piece as seen in figure 7.15.

diagonal axis   *multi-directional*   *0° Axis*
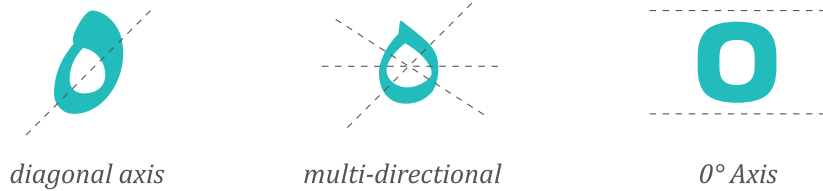
7.2 CLASSIFICATION IN ACTION

The typeface classificatory system created in the previous sections, represents how calligraphic script ground rules, letterform structural influences of Arabic letter forms can adapt into modernly produced typefaces used today. The creation of classificatory categories, and attributes, is the primary stage of the classificatory system. The second stage was adapting the generated system to classify Al-Aqlam-al-Sitta, along with randomly chosen open source fonts according to their visual, structural, and contextual attributes, this is viewed in *"Appendix D: Classifying Fonts into Attributes".*

In this section, an example is represented, on how the list of classifications, along with their attributes could aid designers in the practice of type design, and graphics in their choice of scripts and typefaces when creating logotypes.

7.2.1 EXAMPLE 1: NATURALLY PRODUCED MILK, SOLD AT AUTHENTIC STORES, AND FARMER'S MARKETS

Design Brief - A brand named "Haleeb" is intending to produce and market dairy products, and is focusing on the production of organic milk as a starter. The product is to be sold in authentic stores and farmer's markets in the Arab Region. As the milk product will be part of a brandline of organically produced goods, it should follow the same identity.

Brand Identity - A modern way of approaching naturally produced dairy products. Less machine usage, and more human power, to enhance employment in rural areas of the region.

Major Constraints of Logo design - Logo design should be compatible with the context of which the product will be sold in, and to the packaging system it is used in (glass bottles, and organic textured labels), and logo and accompanying sub-text (including translated information in English) should reflect modernity, and naturally produced goods.

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7.2.1.1 CLASSIFICATION SYSTEM UTILIZATION

According to the typeface classificatory system created, I will follow a step by step process in order to come up with a favorable type choice for the Arabic script logo, and compatible English script.

Classification 01 – Construction & Usage

Source of Emergence - since I have a brand identity to stick to, which is "less machine usage, more human power", then I choose to represent humanity essence using either a Calligraphic based typeface.

In my point of view, since my market will be in the Arab region, the effect of calligraphic scripts are more relatable to my end-users, than experimental freehand ones. So choosing a calligraphic based type would put me on a safer side, when it comes to informing the brand identity. Adding freehand elements and touches to the skeletal type choice would aid in adding the intended sense of modernity.

Calligraphic-based type choice
Freehand elements added to skeletal type choice

Context of Use - since the intended type choice is a display typeface, I should refer to the contexts of which Al-Aqlam-al-Sitta were used in. Going back to the table in Appendix D: Classifying Fonts into Attributes, Thuluth, Naskh, and Reqqa scripts are the most applicable choice for a display type choice. However, the contexts and connotations of these three scripts have evolved in time, where:

Thuluth Script: for its elegance, it has been used in Quraanic ornaments in architectural monuments, and on wedding invitation card titles, certificates and diploma titles and other contexts which require high elegance.

Naskh Script: used in books, copies, and a refined version is used as the main script used in the Quraan. In addition to these contexts, Naskh script is the second commonly used script today among Arabic speakers, as it is the primary script used when learning to write in Arabic. Just like block printing is used when learning English.

Reqqa Script: was used in official documents, books, and press headings before the introduction of movable type to the Arab region. However today, it is the first commonly handwritten script, among Arabic speakers. Since it is the script taught in secondary schools when it comes to learning Arabic writing. The shift from Arabic Naskh script to Reqqa script in schools, is like the shift of Latin block printing to cursive.

Format of Use - looking at the three scripts, when it comes to the type choice format of use, I was left between Naskh and Reqqa Script. But when thinking of my targeted audience, who are mainly middle aged females (because the majority of households in the Arab region, females carry out grocery shopping), I chose the Reqqa script for two reasons: 1. Because Reqqa is the handwriting that reflects adults handwritings 2. It is more dynamic than Naskh, which gives a better organic connotation. Figure 7.16, shows the name of the brand "Haleeb" written in Reqqa script, and Naskh script, so the visual differences could be spotted.

FIGURE 7.16

"Haleeb" Script Style Choice.
The choice of Naskh Script and Reqqa Script. Notice the, the Reqqa has more hand movement than the script style, this is proven by the variability of guidelines, and stroke contrasts.
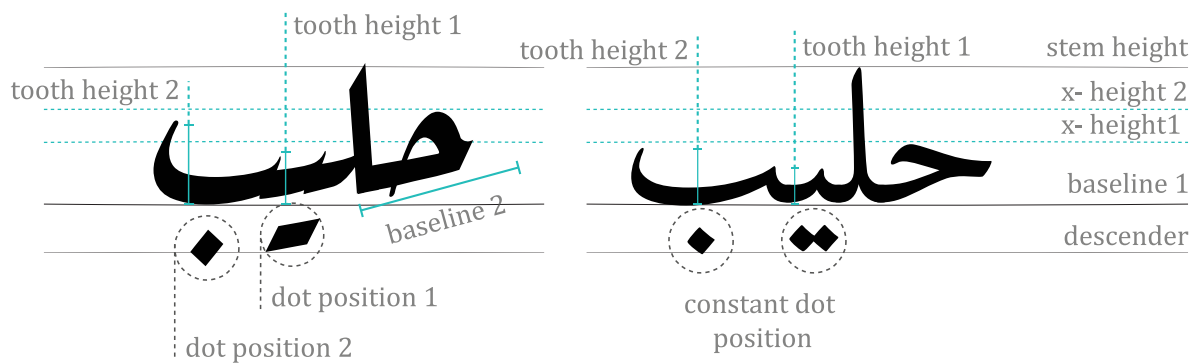
Notice the Reqqa script reflects a more handwritten effect through the strokes, and guideline dynamics, which serves the identity in a better way "more human power", however the Naskh is more stiff, hence reflecting other connotations (which may include academic books, newspapers, children products).

Chosen script: Reqqa Script

Classification 02 – Anatomic Attributes
The logotype I will be using in the design is a word form logo, using a Reqqa-derived script. Therefore I will be studying the classificatory attributes of the letter combination of the word "Haleeb", instead of studying the whole character set.

Going through open source typefaces, I chose three different typefaces which match the Reqqa-script classificatory attributes (viewed in details in *"Appendix E : Reqqa-script Classificatory Attributes"*).

The chosen typefaces are - Aref Reqqa (sourced from Google Fonts, designed by Abdullah Aref, Khaled Hosny, Hermann Zapf) it highly shares Reqqa-script attributes, with less experimental elements

Rakkas (sourced from Google Fonts, designed by Zeynep Akay) it moderately shares Reqqa-script attributes, with balance of experimental elements.

B Shekari (sourced by Arabic Fonts, designed by Omid Moradi) it has less Reqqa-script attributes, more experimental and handwritten

Character Complexity - moderate complexity, as the Reqqa is a fast written script, not too many details are focused on the letter. However complexity could emerge from the stroke contrast. The three typefaces as shown in previous figures share this attribute, of stroke contrast. Example is shown in figure 7.17 on the next page.

Character Differentiation - the word "Haleeb" in Arabic fosters two letters of the same shape, hence differentiated using the dots, which are the "yaa" and the "baa". Although when in isolated and ending forms, both letters look different as seen in figure 7.17, but both are similar when found in medial forms.

FIGURE 7.17

The Dots of Differentiation.
In the first section from the right, notice how the "baa" and "yaa" have different letter structure when in isolated form, thus dots do not play a crucial role. However within a word, both letters have similar structures, dots are important to differentiate. Single and double dots are used in the word form "haleeb", as represented in the third section of the figure.

(triple) (double) (single)

"haleeb" in Aref Ruqaa

"baa" *"yaa"*

(triple) (double) (single)

"haleeb" in Rakkas

"baa" *"yaa"*

(triple) (double) (single)

"haleeb" in B Shekari

"baa" *"yaa"*

dots used within
the three typefaces
"resemblance with Reqqa"

letter structure
within the word
"dots used to differentiate"

letter structure
in isolated form
"different structures"
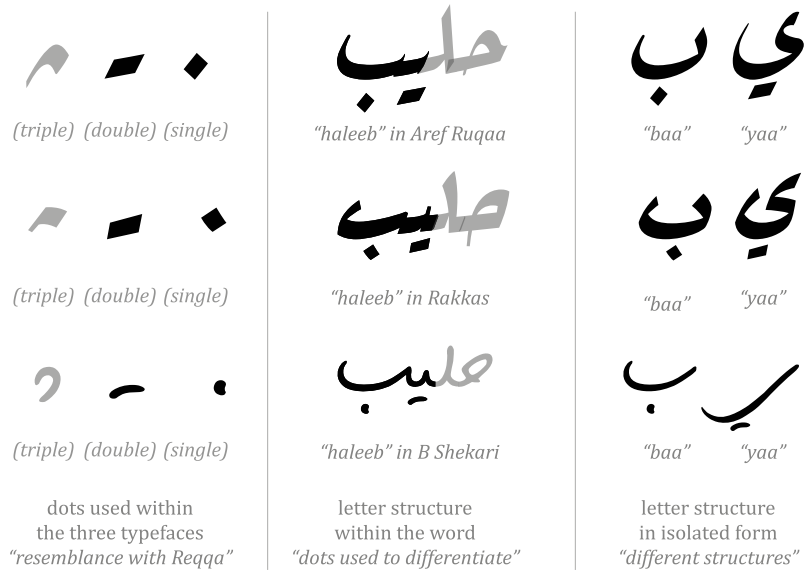
Dots Relativity & Shape - dots within the Reqqa Script vary in their structure (single: rhombus, double: horizontal swash, triple: curved swash). Dots that will be used in the logotype are a single dot for the letter "baa", and a double dot with the "yaa". The use of dots could be seen in figure 7.17. Notice how the three typefaces stick to the "dot, swash" rule of the Reqqa Script. However the B Shekari font moves towards a different tool (nib head), and therefore dots do not look like a rhombus, more like a single point.

Closed Shapes - the Reqqa script is a script that has closed shapes. However when dealing with the word form of the logo, there will be no need to consider closed shapes, since none of the letters have the "eye" part in their anatomy.

Bowl Form - the Reqqa script is known for having a curved bowl form, however, as is the case with closed shapes, in the word form of the logo, there will be no need to consider the bowl form, since none of the letters have the "bowl" in their anatomy.

Kashida Usage - Kashidas are not used in Reqqa Scripts, adding a Kashida here could affect the Arabic letter structures of the Reqqa Script. However, as an experimental touch, or addition of a freehand, I was able to add a Kashida to the letter "baa" where it is the most applicable. None of the fonts had a Kashida option within, I had to add extensions by myself.

FIGURE 7.18

Application of the Kashida.
Kashidas were added to the letter "baa" of the word form, as it is where the most applicable extension could be added, without elongating the word "Haleeb". Adding an extension to both Aref Ruqaa, and B Shekari fonts (first and third row) did not affect the letter structure of "baa" radically. But when adding it to the Rakkas font (second row) , it was difficult to change the structure, due to its thick horizontals.

"haleeb" in Aref Ruqaa

"haleeb" in Rakkas

"haleeb" in B Shekari

"baa" after Kashida   *"baa" before Kashida*

Weight & Strokes Attributes - this section of the attributes includes the stroke's thickness, contrast and stroke terminals (the beginning and endings). When representing the Reqqa script styles, it should be thick stroked, with moderate contrast, and terminals are diagonally trimmed.

Vertical and proportional guidelines - this attribute allows one to understand the guidelines of which the script deals with. Reqqa script style is a dynamic script, hence one can notice the fluidity in the guidelines. Figure 7.19 shows how the fluidity of the word "Haleeb" could be enhanced, by the fluidity of the guidelines. (Main fluidity attributes from Reqqa style script: baseline, dots and diacritics fluidity, stem height variability, short and dynamic ascenders, descenders and tooth heights).

FIGURE 7.19

Enhancing Type Guidelines.
Enhancing the high fluidity of the Reqqa Script could be successful when allowing variability in y-axis guidelines to take place within a word. I was able to create different stem height, tooth height, and x-height options for each typeface. Dots positions are designed to have some variability from the typeface itself.
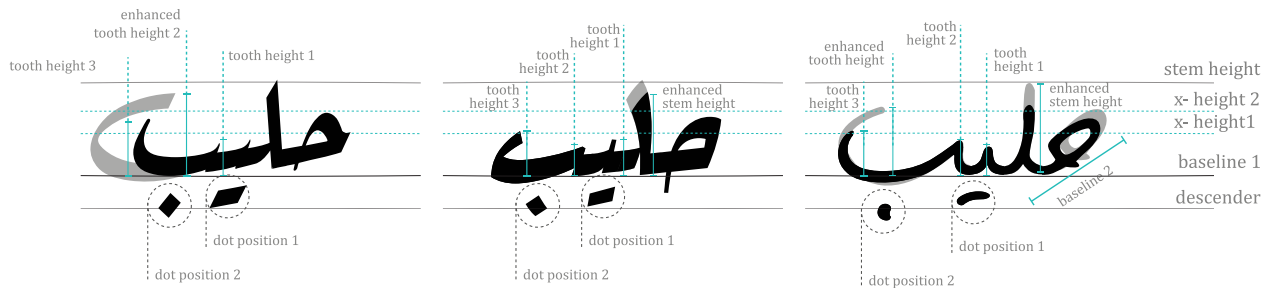
Range of Characters - usually the Reqqa script was used for Arabic, and Turkish languages. Therefore glyphs, dots, diacritics, ligatures, and numerals only covered these two languages. Today, with the aid of computerized tools, Reqqa-styles scripts could have a wider range of characters to cover more Arabic-script using languages. However, with the case of the logotype I am using, these attributes are not required, since when designing a word, which belongs to the Arabic language, variability of glyphs could be needed to enhance high letter to letter connectivity.

Classification 03 – Connectivity & Harmony
To enhance the "human power" effect and connotation I want to present into the logo, this classification should be an essential one. When using a Reqqa-derived typefaces, one should focus that Reqqa scripts have no slants within their verticals, axis of contrast is more of a horizontal axis, cursivity is high, to reflect high writing speed.

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7.2.1.2 TYPEFACE APPLICATION

After going using the classificatory system, I was able to have three typeface options for my generated logo. The classificatory system aided my process by selecting type choices from a certain script, enhancing anatomic attributes to help maintain the original script which was the Reqqa Script, and modify some elements in order to optimize the human touch into the logo. Final generated along with their sub-scripts were generated. Applying my logos into the packaging, and layout it was the final step of my logo design process, which is seen in figure 7.20.

حليب

منتج الأول لحليب العضوي | **organically produced milk**

حليب

منتج الأول لحليب العضوي | **organically produced milk**

منتج الأول لحليب العضوي
organically produced milk

حليب

صنع في الاردن   product of Jordan
حركه قبل الاستعمال   shake well before use
يخزن في الثلاجة   **keep refrigerated**

FIGURE 7.20

Application of "Haleeb" logo. The three options are placed onto glass bottles, to test if they match the identity, and intended packaging of the milk product.

8 | DISCUSSION & CONCLUSION

The primary outcome of this research investigation is an Arabic typeface classificatory system, carrying attributes from the origins of the calligraphic scripts, and adapting them into typefaces which are used today. In the beginning of my research, my aim was to create a tool kit that would assist graphic and type designers to better understand and use Arabic typefaces, particularly in recognizing and controlling the typographic connotations in the context of the communicated content.

As my research evolved, I came to the conclusion that a gap has been created between the constant evolution of calligraphy and the emergence of typography. Therefore my research focused in this area, as I wanted to investigate the gap. My semi-structured interviews with subject matter experts in the Arab region, along with my qualitative observation into the evolution of the writing system, led me to notice the missing span of this bridge. Arabic calligraphy evolved in a complex and culturally influenced way, in which structural and anatomic guidelines were created, along with several classification systems, and conventions of usage. Typography came late, due to the prohibition of printing during the Ottoman empire, it was produced using Latin-based typographic guidelines, yet with several linguistic structural adaptations.

My outcome shifted, yet my aim was still to aid graphic and type designers in optimizing the usage of Arabic typefaces. The generation of a type classificatory system, based on the calligraphic rules, scripts and adapting new typefaces into the system could help bridge contemporary typography to its linguistic, cultural and calligraphic roots. Going through existing classification systems, and carrying out continuous inductive techniques, and categorizing data led me to the outcome presented in this paper.

My focus on Al-Aqlam-Al-Sitta as the basis of the classification system was my main aim of reviving script attributes into typographic designs today. Integrating the originating ground rules was an approach to link the characteristics of Al-Aqlam-Al-Sitta to typographic attributes of typefaces. At first, I wanted the mentioned six

scripts to be the classes of which I will be categorizing typefaces into, but as I moved on with my qualitative observation, I have noticed that, just like any other scripts and typefaces within different writing system, Naskh, Nastaaliq, Diwani, along with contemporary typefaces are considered hybrids in their origins. For example, Naskh emerged from the ground rules of the Kufic Script, and the Thuluth Script, therefore, it is difficult to place hybrid scripts into one solid category.

There are three classes that were used to categorize the scripts and typefaces, which were Classification 01 (Construction and Usage), Classification 02 (Anatomic Attributes), and Classification 03 (Connectivity and Harmony). In classification 01 – Contrast and Usage, I have intended to create a flexible classification criteria, in order not to place the typeface into a strict category. Including Lati, and freehand as a source of emergence was something I added later in my observation, as I have noticed that designers are shifting into creating Arabic versions of Latin existing typefaces, in addition to creating numerous experimental fonts. Classification 02 – Anatomic Attributes, mainly focused on the description of the typeform, and how can each typeform transcend from one of the six scripts of Al-Aqlam-Al-Sitta. During my clustering and data processing, I have noticed how typefaces transcend calligraphic attributes. Computer tools today have adapted the 1/3 angled reed pen that creates the Thuluth script, therefore typefaces can easily emerge from the Thuluth Script, having similar dot shapes, proportions, stroke contrast, beginning and ending. Classification 03: Connectivity & Harmony, was the most surprising class in my system. I was focusing on this system to measure the level of adaptiveness typefaces have achieved in imitating the human touch found in Al-Aqlam-Al-Sitta, it was easy to classify fonts which emerged from calligraphic origins, however fonts that belonged to the Latin and freehand category where a bit difficult for me to classify.

After application, and testing I have realized that this classification system could be further used in the practice of type design. Not only could it help designers choose a font that is pertinent to a desired message, and content, but it also offers an informative aspect, helping type designers in creating more Arabic typefaces. An unintended solution to the scarcity of typefaces, this classification system could guide typographers in creating typefaces that are pertinent to a desired message and content. Having a closer look into structural in-

fluences of Arabic letterforms, along with adapted typographic units, would help them create typefaces that carry the cultural, linguistic, and contextual essence of the Arabic writing system. The application section within the paper, had also made me realize the extensive approaches a designer could take in modifying and enhancing visual attributes within letterform and structural elements. In the "Haleeb" example, modifying existing typefaces in order to fit my context and brand identity was a whole new experience to me. As I went into further and more detailed modifications, I now know more anatomic details within Arabic letter structures. I am truly ambitious that this framework will be further utilized in different systems, not only in the design practice, but also the academic practice within graphic design schools and calligraphy.

For further work, and research, I am aiming to expand my research and immerse myself into the fields of cognitive semiotics, and linguistics, in order to understand the classification system's attributes from different perspectives. Having a linguistic angle integrated into my system, along with taking human perception into consideration, could take this outcome into far greater levels, hence aiding graphic and type designers even more.

Both Latin and Arabic scripts and typefaces are used by designers in the Arab region. Therefore this research investigation should be a starting point in creating new approaches to typeface coupling and utilization. The Arabic writing system, more than the very widely used Latin system, has continued to have strong linguistic, cultural, and contextual roots. It is important not to neglect these aspects in contemporary usage, and that its employment and development should be based on a framework that has its roots in the cultural origins of Arabic rather than simply adapt the hegemonic Latin framework. At the same time, Arabic script exists in the modern context, so needs tools for typographic design and use that allow it to adapt to the changing needs of design usage without losing sight of its origins and meanings to contemporary and future audiences. Finally, recognizing that current usage often involves the juxtaposition of Arabic with Latin and other scripts, a coherent system will aid designers in taking a systematic approach to the visual and semiotic relationships between the different scripts.

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APPENDICES

Appendix A : Letterform Anatomy, & Guidelines
A description of Arabic type anatomy, and letterform guidelines, in relation to the Latin script, and type guidelines.

"APPENDIX B : Creation & Early Evolution of Arabic Script"
An overview of the creation of the Arabic writing script, along with the early evolution. Along with the contribution of Islam, and production of Quraan to the evolution of the writing system.

"Appendix C : Typeface Categorization Systems & Classifications"
A detailed description of the existing classification systems, and how they work. Classification systems include the IBM Classification System, Panose-1 , Panose-A, Catherine Dixon's Classification System, and font sources categorization systems.

"Appendix D: Classifying Fonts into Attributes"
Applying the generated classification system on random open source typefaces, along with the classification of Al-Aqlam-al-Sitta.

"Appendix E : Reqqa-script Classificatory Attributes"
A detailed classification of structural influences of letterforms, and visual attributes.

sky 1

loop-eyeheight 1

loop-eyeheight 1

tooth height 3

tooth height 2

tooth height 1

baseline thickness

baseline

earth 2

earth 1

arm

sokoun

leg

kasra

diacritic dots

ascender

neck

basin

descender

eye

bowl

tooth

tail

chin

arm

belly

tanween al damm

spine

descender

tanween al kasr

APPENDIX B : CREATION & EARLY EVOLUTION OF ARABIC SCRIPT

A .1 THE CREATION & EVOLUTION OF THE ARABIC WRITING SYSTEM

Arabic belongs to a Semitic alphabetical script. Theseare mainly represented by consonants. The cusively written Arabic script used today evolved from the Arabic-Nabatean writing system. The Arabic-Nabatean system was adopted from the Aramaic writing system, which was previously adopted from a Mesopotamian system of writing and linguistic preservation. (Abdel Qader, 2006) (Osborn, 2008)

To gain a better picture of the script's genealogy , one needs to understand how Nabateans lived back in the 2nd till the 4th century. The Nabateans were a group of people who lived in the Mesopotamian area, and were well known as traders across the Arab region. As traders, travelling from Yemen to Petra, Nabateans started adopting their writing technology in Aramaic script, in order to inscribe trade registers. As their trade routes changed to cover Arabic speaking regions, their script started evolving from an Aramaic script of distinct isolated forms, to a connected script, with ligatured letters known as the Arabic script.

It was no earlier than the 6th century when the first Arabic script, specifically created to cover the Arabic language, was created. The script was referred to as the Jazm script. The most innovative aspect of the Jazm script was the visibility of the horizontal line connecting letters of a single word together. Derived from the Arabic-Nabatean alphabets, this script was the very first reference for later created Arabic scripts . Thus being a visually unrefined script, distinctive visual properties of the Jazm script, later influenced some of the Arabic styles, which include the Kufic we use until today. Such visual properties include letters of equal proportions and stiff angular overall appearance (AbiFarès, 2001).

A.1.1 CONTRIBUTION OF ISLAM TO THE ARABIC WRITING SYSTEM

The Arabic writing witnessed its second radical evolution after the rise of Islam. As Islam was more focused in Arabic speaking regions, Arabic writing was commonly used. Due to new political, religious and cultural situations, new needs required new uses of the Arabic writing (Khatibi & Sijelmassi, 1995). The holy Quraan (the holy book of Islam) was first revealed as fragments to the Muslim Prophet Mohammad during the seventh century, however it was orally preserved through reciters called the huffaz, hence not textually. The revelation of Quraan segments stopped after the death of the prophet, which thereby established the final edition of the Quraan.

Leaving the holy Quraan as an orally preserved message, and words was a threat to the Islamic state, especially when most of the reciters who memorized its words directly through the prophet had lost their lives in battles and age. This had urged the prophet's believers to initiate an alternative way of preserving the words of the Quraan, which was through collecting the Quraan as a written text (Safadi, 1979). The preservation of the Quraan followed a task of collecting, and assembling fragments of the holy recited words. Where each piece was verified and confirmed against the oral testimonies of the huffaz. Once a complete version is gathered, the binded pages of written text —referred to as Mus'haf—consisting of thirty chapters, was authorized for distribution, to major centers of Muslim expansion for copy, correction and verification (Osborn, 2008).

Scribal styles of which were used in writing the early Mus'haf, were mainly three, which are the Makki, Madani, and Kufic scripts. All names after the cities in which they were written in. These three scribal styles carried the same characteristics of refined text, proportional balance and splendor. Today, all these scribal styles fall under the category of the popular geometric script named Kufic (AbiFarès, 2001).

A series of scribal style reformations took place during the Umayyad and Abbasid dynasties, in order to optimize the appearance and visual properties of the Arabic writing system. The Umayyad dynasty started the official use of Arabic language in all state documents,

using the grand Naskh script of Tumar (AbiFarès 2001). This was the age where the world witnessed the first writings on coins. Instead of images, signs of visual authority were displayed as Arabic script, which was later considered as an innovation (Abdel Qader, 2006). Choices of scribal styles distinguished the reign of one dynasty from another. The shift from Tumar text of the Umayyads, to the Tawqi script indicated the shift from the Umayyad Dynasty on to the Abbasid. Tawqi script was the official signature script of administrative pronouncements adopted by the Abbasids (Abdel Qader, 2006). Details about these scripts are mentioned in the next section of the chapter.

Along the evolution of scribal styles the Mus'haf initiated was an evolution in the written linguistic structure of the Arabic language itself. The seventh century also witnessed a radical shift in the Arabic writing system, which is the start of using dots. Early Arabic writing systems did not develop any dot, or diacritic system, because people relied on the oral preservation of information. However, the spread of Islam, and the distribution of the Mus'haf, led to the development of a change in linguistic habits of the Arabic spoken language, which would also change meaning of the textual pronouciation of the Quraan, and the full meaning of the words of the Prophet Mohammad would be lost or misunderstood. This problem was tackled after Abul Aswad ad-Du'ali, an Umayyad scholar, proposed a system for translating oral vocalizations onto textual ones, through the use of tashkil, which are diacritic marks, in the form of colored dots. As alluded to in the previous chapter, the Al-Fatha mark (was place on top of the letter), Al-Damma mark(was placed inside the letter), Al-Kasra (was placed below the letter), where as the Al-Tanween (were placed according to their singular coordinates, but instead of single dot, they were doubled) (El-Labad, 2014) .

The use of colored dots as tashkil (diacritic marks) did not last long. These dots were later refined into eight new diacritical marks, which are the ones we see today.

The dots remained within the visual representation of the Mashaf, however serving a different function. Dots were further used between different consonants sharing the same letterform, these dots were referred to as the nokte. These diacritical marks, and dots, have aided the proper recitement of Quraanic verses, and also the Arabic

language itself, making it a legible language to be spoken, learnt and recited (El-Labad, 2014) . Diacritical marks are used today in the Arabic writing system, as they play an important role in the meaning and structure of the language.

APPENDIX C : TYPEFACE CATEGORIZATION SYSTEMS & CLASSIFICATIONS

C.1 IBM CLASSIFICATION

Class ID	Name Derivative
CLASS ID = 1: Old Style Serifs This class is reserved for typefaces that are based on Latin printing typefaces, of which their date of emergence lies between 15th-17th centuries. Visual Appearance: letterforms have mild stroke contrasts, and bracketed serifs. Contains 8 subclasses, 9-14 reserved for future IBM fonts, 15 represents miscellaneous sub-class.	Sub-class 0: no design sub-classification
	Sub-class 1: IBM Rounded Legibility (sub-classification characteristics include large x-height, short ascenders and descenders)
	Sub-class 2: Garalde (sub-classification characteristics include medium x-height, tall ascender)
	Sub-class 3: Venetian (sub-classification characteristics include, medium x-height, monotone appearance, and sweeping tail)
	Sub-class 4: Modified Venetian (sub-classification characteristics include, large x-height, monotone appearance, and sweeping tail)
	Sub-class 5: Dutch Modern (sub-classification characteristics include, large x-height, wedge shape serif, and circular bowl)
	Sub-class 6: Dutch Traditional (sub-classification characteristics include, large x-height, wedge shape serif, and circular bowl)
	Sub-class 7: Contemporary (sub-classification characteristics include, small x-height, light stroke and serif)
	Sub-class 8: Calligraphic (sub-classification characteristics include, fine handwritten old style calligraphic appearance)
	Sub-classes 9-14, reserved for IBM future fonts
	Sub-class 15: Miscellaneous Fonts (class reserved for fonts that are not covered by any classification)
CLASS ID = 2: Transitional Serifs This class is reserved for typefaces that are based on Latin printing typefaces, of which their date of emergence lies between the 18th-19th centuries. Visual Appearance: bracketed serifs, and noticeable vertical contrast (vertical stroke thickness is heavier than horizontal) Contains 2 subclasses, 3-14 reserved for future IBM fonts	Sub-class 1: Direct Line (sub-classification characteristics include medium x-height, fine serifs, constant width of uppercase letters)
	Sub-class 2: ScripT (sub-classification characteristics include handwritten script, which maintain the class characteristics)
	Sub-classes 3-14, reserved for IBM future fonts
CLASS ID = 3: Modern Serifs This class is reserved for typefaces that are based on Latin printing typefaces, of which their date of emergence lies in the 20th century. Visual Appearance: high contrast between heaviest and lightest stroke of a single glyph. Contains 2 subclasses, 3-14 reserved for future IBM fonts	Sub-class 1: Italian (sub-classification characteristics include medium x-height, hairline serifs)
	Sub-class 2: Script (sub-classification characteristics include handwritten script, which maintain the class characteristics)
	Sub-classes 3-14, reserved for IBM future fonts

CLASS ID = 4: Clarendon Serifs This class is reserved for typefaces that have characteristics of both Class ID =1 (Old serif style) and Class ID=2 (Transitional serif style) Visual Appearance: large x-height, letterforms have mild stroke contrasts (vertical stroke thickness is heavier than horizontal) Contains 7 subclasses, 8-14 reserved for future IBM fonts	Sub-class 1: Clarendon (sub-classification characteristics include similar weights of over all glyph stroke, and serifs)
	Sub-class 2: Modern (sub-classification characteristics include moderate stroke weight, serifs are thinner than overall glyph stroke)
	Sub-class 3: Traditional (sub-classification characteristics include serifs thinner than overall glyph stroke)
	Sub-class 4: Newspaper (sub-classification characteristics include serifs thinner than overall glyph stroke)
	Sub-class 5: Stub Serif (sub-classification characteristics include, short stub serif, and bold stem)
	Sub-class 6: Monotone (sub-classification characteristics include, monotone stems)
	Sub-class 7: Typewriter (sub-classification characteristics include, stroke width is moderately thick, appearance of typewriter style)
	Sub-classes 8-14, reserved for IBM future fonts
CLASS ID = 5: Slab Serifs This class is reserved for typefaces that are characterized with square translation between glyph strokes and serifs Contains 5 subclasses, 6-14 reserved for future IBM fonts	Sub-class 1: Monotone (sub-classification characteristics include large x-height, equal stroke weight of overall glyph and serif)
	Sub-class 2: Humanist (sub-classification characteristics include medium x-height, serif weight is lighter than overall glyph stroke
	Sub-class 3: Geometric (sub-classification characteristics include large x-height, equal stroke weight of overall glyph and serif)
	Sub-class 4: Swiss (sub-classification characteristics include large x-height, equal stroke weight of overall glyph and serif , allowing more white space)
	Sub-class 5: Typewriter (sub-classification characteristics include, large x-height, equal stroke weight of overall glyph and serif, with geometric design style)
	Sub-classes 6-14, reserved for IBM future fonts
CLASS ID = 7: FreeForm Serifs This class is reserved for typefaces that include serifs, but more freedom in design features and characteristics that are not classified under other serif classes. Contains 1 subclass, 9-14 reserved for future IBM fonts	Sub-class 1: Modern (sub-classification characteristics include medium x-height, light contrast between overall glyph stroke weight, and round full design) Sub-classes 2-14, reserved for IBM future fonts
CLASS ID = 8: SanSerif This class is reserved for typefaces that have no serifs in their structure. Contains 8 subclasses, 7-8 and 11-14 reserved for future IBM fonts	Sub-class 1: IBM Neo-grotesque Gothic (sub-classification characteristics include large x-height, uniform stroke thickness of glyph)
	Sub-class 2: Humanist (sub-classification characteristics include medium x-height, light contrast in overall glyph stroke, and letterform is classical roman)
	Sub-class 3: Low-x Round Geometric (sub-classification characteristics include, low x-height, monotone appearance, and round geometric designs)
	Sub-class 4: High=x Round Geometric (sub-classification characteristics include, high x-height, uniform thickness, and round geometric design)

CLASS ID = 8: SanSerif This class is reserved for typefaces that have no serifs in their structure. Contains 8 subclasses, 7-8 and 11-14 reserved for future IBM fonts	Sub-class 5: Neo-grotesque Gothic (sub-classification characteristics include, high x-height, uniform stroke thickness and simple one story design
	Sub-class 6: Modified Neo-grotesque Gothic (sub-classification characteristics include, similar characteristics to Neo-grotesque Gothic with a different design for letters 'G' and 'Q')
	Sub-classes 7-8, reserved for IBM future font
	Sub-class 9: Typewriter Gothic (sub-classification characteristics include, similar characteristics to Neo-grotesque Gothic with modern stroke thickness, and typewriter style)
	Sub-class 10: Matrix (sub-classification characteristics include,simple designs that are suitable for dot matrix printers)
	Sub-classes 11-14, reserved for IBM future font
CLASS ID = 9: Ornamentals This class is reserved for typefaces that carry ornamental designs and extra design characteristics. Contains 4 subclasses, 5-14 reserved for future IBM fonts	Sub-class 1: Engraver (sub-classification characteristics fine lines as an overall glyph stroke, or engraved on stems)
	Sub-class 2: Black Letter (sub-classification characteristics include styles that are used in the 12th and 15th century, used within German monasteries)
	Sub-class 3: Decorative (sub-classification characteristics include ornaments in their stems adapted from nature, such as leaves, flowers, and animals)
	Sub-class 4: Three Dimensional (sub-classification characteristics include shading or geometric effects that form a 3-D appearance
	Sub-classes 5-14, reserved for IBM future fonts
CLASS ID = 10: Scripts This class is reserved for typefaces that are based on hand-written appearances Contains 8 subclasses, 9-14 reserved for future IBM fonts, 15 represents miscellaneous sub-class.	Sub-class 1: Unical (sub-classification characteristics include hand drawn non-connected characters that resemble handwriting style used during the 6th – 9th century in Europe
	Sub-class 2: Brush Joined (sub-classification characteristics include connected characters with moderate contrast)
	Sub-class 3: Formal Joined (sub-classification characteristics include connected characters, with the effect of stiff brush hand drawn strokes)
	Sub-class 4: Monotone Joined (sub-classification characteristics include, connected hand drawn letters, with low or no contrast)
	Sub-class 5: Calligraphic (sub-classification characteristics include, non-connected characters, with the effect of a broad edge pen hand drawn strokes)
	Sub-class 6: Brush Unjoined (sub-classification characteristics include, non-connected characters, with moderate contrast, and have the effect of brush hand drawn strokes)
	Sub-class 7: Formal Unjoined (sub-classification characteristics include, non-connected characters, with high contrast, and have the effect of stiff brush hand drawn strokes)
	Sub-class 8: Monotone Unjoined (sub-classification characteristics include, non-connected characters, with low or no contrast)
	Sub-classes 9-14, reserved for IBM future fonts

CLASS ID = 12: Scripts	Sub-classes 0-2, reserved for IBM future fonts
This class is reserved for typefaces with special forms, and characteristics	Sub-class 3: Mixed Serif (sub-classification characteristics include characters that are a combination of serif and san serif, such as numbers and symbols)
Contains 4 subclasses, the rest are reserved for future IBM fonts	Sub-classes 4-5, reserved for IBM future fonts
	Sub-class 6: Old Style Serif (sub-classification characteristics include old style serifs, bracketed and thick)
	Sub-class 7: Neo-grotesque Sans Serif (sub-classification characteristics include characteristics that are similar to Neo-grotesque Sans Serif class)
	Sub-classes 8-14, reserved for IBM future fonts

C.2 PANOSE-1 CLASSIFICATION SYSTEM

Each characteristic within a single font type family takes values between 0-15, 0-9, or A-F, depending on the levels that exist in a single class. These values are measured and calculated according to algorithms design that measure every attribute. Below is an example of how digits in the Panose-1 system works. Example provided is the Latin Handwritten type family (since it was the most helpful, when relating to my generated classification system). Digits are used as classification attributes to classify fonts.

Digit 1 Family Type	Digit 2	Digit 3	Digit 4	Digit 5	Digit 6	Digit 7	Digit 8	Digit 9	Digit 10
2=Latin Text	Serif Style	Weight	Proportion	Contrast	Stroke Variation	Arm Style	Letterform	Midline	x-height
3=Latin Handwritten	Tool Kind	Weight	Spacing	Aspect Ratio	Contrast	Topology	Form	Finials	x-acsent
4=Latin Decorative	Class	Weight	Aspect	Aspect	Contrast	Serif Variant	Treatment	Lining	Topology
5=Latin Pictorial	Kind	Weight	Spacing	Aspect ratio of Contrast	Aspect ratio of character 94	Aspect ratio of character 119	Aspect ratio of character 157	Aspect ratio of character 163	Aspect ratio of character 211

The next page shows an example on how the Panose-1 system works, according to its digits and sub-digits. The example is done on the Latin Handwritten type family.

C.2.1 PANOSE-1 IN ACTION - AN EXAMPLE

Digit	Sub-digit
Digit 1: Font Type Family	0-Any, 1-No Fit, 2-Latin Text, **3-Latin HandWritten**, 4-Latin Decorative, 5-Latin Symbol
Digit 2: Tool Kind **D**escription: this sub-digit classifies the appearance of the type of tool being used on the font	0-Any, 1-No Fit, 2-Flat Nib, 3-Pressure Point, 4-Engraved, 5-Ball (Round Cap), 6-Brush, 7-Rough, 8-Felt Pen/Brush Tip. 9-Wild Brush – Drips a lot
Digit 3: Weight Description: this digit classifies appearance of the stroke thickness in relation to the stroke height. This is measured by finding the ratio between the thickness and height of the upper case (E) glyph.	0-Any, 1-No Fit, 2-Very Light, 3-Light, 4-Thin, 5-Book, 6-Medium, 7-Demi, 8-Bold, 9-Heavy, 10-Black, 11-Extra Black (Nord)
Digit 4: Spacing Description: this digit classifies fonts, on the appearance of their spacing, it determines whether the font is monospaced or proportional spaced.	0-Any,1-No fit,2-Proportional Spaced, 3-Monospaced
Digit 5: Aspect Ratio Description: this digit determines the ratio of the width and height of the upper case letter (O) .	(0-Any, 1-No Fit, 2-Very Condensed, 3-Condensed, 4-Normal, 5-Expanded, 6-Very Expanded)
Digit 6: Contrast Description: this digit determines the contrast of the stroke, which is measured by finding the ratio between the thickest part of the upper-case of letter (O) and the thinnest part.	0-Any, 1-No Fit, 2-None, 3-Very Low, 4-Low, 5-Medium Low, 6-Medium, 7-Medium High, 8-High
Digit 7: Topology Description: this digit classifies appearance in two levels, classifying the type of letter by itself (Roman, cursive, or blackletter), then connections between the letters are classified.	0-Any, 1-No Fit, 2-Roman Disconnected, 3-Roman Trailing, 4-Roman Connected, 5-Cursive Disconnected, 6-Cursive Trailing, 7-Cursive Connected, 8-Blackletter Disconnected, 9-Blackletter Trailing, 10-Blackletter Connected
Sub-digit 8: Form Description: it measures the general look of the face, by calculating the slope of verticals, wrap of tails that connect strokes.	0-Any, 1-No Fit, 2-Upright / No Wrapping, 3-Upright / Some Wrapping, 4-Upright / More Wrapping, 5-Upright / Extreme Wrapping, 6-Oblique / No Wrapping, 7-Oblique / Some Wrapping, 8-Oblique / More Wrapping, 9-Oblique / Extreme Wrapping, 10-Exaggerated / No Wrapping, 11-Exaggerated / Some Wrapping, 12-Exaggerated / More Wrapping , 13-Exaggerated / Extreme Wrapping
Sub-digit 9: Finials Description: it classifies the appearances of the treatment of character ends, and the treatment of lower case ascenders.	0-Any, 1-No Fit, 2-None / No loops, 3-None / Closed loops, 4-None / Open loops, 5-Sharp / No loops, 6-Sharp / Closed loops, 7-Sharp / Open loops, 8-Tapered / No loops, 9-Tapered / Closed loops, 10-Tapered / Open loops, 11-Round / No loops, 12-Round / Closed loops, 13-Round / Open loops
Sub-digit 10: x-ascent Description: this digit, measures the relative sizes of lower case characters.	0-Any, 1-No Fit, 2-Very Low, 3-Low, 4-Medium, 5-High, 6-Very High

C.3 PANOSE-A CLASSIFICATION SYSTEM

Just like Panose-1, each classification attribute digit within a single font type family takes sub-digits between 0-15, depending on the levels that exist in a single class. These values are measured and calculated according to algorithms designed that measure every attribute. Below is an example of how digits in the Panose-A system works. Digits are used as classification attributes to classify Naskh font family

Digit 1	Digit 2	Digit 3	Digit 4	Digit 5	Digit 6	Digit 7	Digit 8
Weight	End-Style	Contrast	Bowl Form	Curve Tail Form	Tooth Height	Loop Height	Round Stokes

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C.3.1 PANOSE-A IN ACTION - AN EXAMPLE

Digit	Sub-digit
Digit 1: Weight Classification Description: this sub-digit classifies the overall stroke thickness of a single glyph. As Arabic letterforms are curved by the nature of the nib's head, stroke weight varies in a single glyph.	0 – Any, 1 – No Fit, 2 – Light, 3 – Regular, 4 – Bold
Digit 2: End Style Classification Description: this sub-digit classifies the appearance of the terminal stroke of a glyph. Usually determined by letters Baa, Aein, Noon	0-Any, 1-No Fit, 2-Flat Nib, 3-Pressure Point, 4-Engraved, 5-Ball (Round Cap), 6-Brush, 7-Rough, 8-Felt Pen/Brush Tip. 9-Wild Brush – Drips a lot
Digit 3: Contrast Classification Description: this digit classifies the contrast of the thickest and thinnest parts of the glyph, ratio is calculated to give the sub-digit value.	0 – Any, 1 – No Fit, 2 – None, 3 – High, 4 – Medium, 5- Low
Digit 4: Bowl Form Classification Description: this digit classifies fonts, on the appearance of their bowl form. It is determined by measuring the vertical and horizontal breadth, and the symmetry of the bowl open counter, of the letter (aein)	0 – Any, 1- No Fit, 2- Normal / Oblique Upward, 3- Normal / Oblique Downward, 4- Normal / Symmetric, 5- Squeezed / Oblique Upward, 6- Squeezed / Oblique Downward, 7- Squeezed / Symmetric, 8- Stretched / Oblique Upward, 9- Stretched / Oblique Downward, 10- Stretched / Symmetric
Digit 5: Curve Tail Form Classification Description: this digits determines the curve tail form is described with variables similar to ones used to describe the bowl but the measurements are taken on the letter Noon	0 – Any, 1- No Fit, 2- Normal / Oblique Upward, 3- Normal / Oblique Downward, 4- Normal / Symmetric, 5- Squeezed / Oblique Upward, 6- Squeezed / Oblique Downward, 7- Squeezed / Symmetric, 8- Stretched / Oblique Upward, 9- Stretched / Oblique Downward, 10- Stretched / Symmetric
Digit 6: Tooth Height Classification Description: this digit determined by the two teeth strokes at the beginning of the letter Siin. This classifies fonts according to height variation and the proportion between the first tooth to the ascender.	0 – Any, 1 – No Fit, 2 – Standard / Small (1/3 or less than ascender), 3 – Standard / Middle (larger than 1/3 or less than 2/3 of the ascender), 4 – Standard / Large (larger than 2/3 of the ascender), 5 – Constant / Small (1/3 or less than ascender), 6 – Constant / Middle (larger than 1/3 or less than 2/3 of the ascender) , 7 – Constant / Large (larger than 2/3 of the ascender)

Digit 7: Loop Height Classification
Description: this digit classifies class values and the thresholds that classify them are similar to Tooth Height digits except that the measurements are based on the letters Faa, Waaw

0 – Any, 1 – No Fit, 2 – Standard / Small, 3 – Standard / Middle, 4 – Standard / Large, 5 – Constant / Small, 6 – Constant / Middle, 7 – Constant / Large

Sub-digit 8: Round Stroke Classification
Description: Round strokes are described by the shape of its counter. One attribute in this digit is to classify the shape of the counter, and how much the country's shape is far from any of the five geometric shapes, which are triangle, circle, oval, square or rectangle.

0 – Any, 1 – No Fit, 2 – Triangle, 3 – Oval, 4 – Circle, 5 – Rectangle, 6 – Square

C.4 CATHERINE DIXON'S CLASSIFICATION SYSTEM

C.4.1 FORMAL ATTRIBUTES & SUB-ATTRIBUTES

Attributes	Sub-attributes
Construction: Each character in a typeface has a number of composed parts. These are often referred to as strokes. Strokes can be constructed in a number of ways, which include:	Continuous Construction : (no points of transition between strokes and elements)
	Broken or Interrupted Construction: (points of transition between strokes, clear breaks between elements, letterforms can be also modular, where a single component forms the letter)
	Other Approaches:(experimental, and random strokes)
	Reference to Tool: (strokes imitates tools, and industrial machines, eg. scissors, round pen)
	Reference to Character sets: (strokes refer to full uppercase, or full lowercase elements)
Shape Shapes that embodied alphabets of the Latin Script, and the evolution of these letterforms. The treatment of letterforms, and their variations could be a main element of creating a typeface.	Variants of Traditional Forms: (curving straight lines, rounded corners, and irregular character elements)
	Treatment of Curves: (angular, broken, or continuous curves)
	Aspect of Curves: (oval, round,circular, round, rounded square, square)
	Details of Curves: (shape of bowl forms, and treatments)
	Upright Stems: (shape of stokes, convex, concave, parallel, irregular)
	Other Details: (cross bar position, other anatomic elements)
Proportions Used to describe basic letterform dimensions and use of the surrounding space	Width: (fonts are available as singular or as family, letterform widths include: condensed, medium, or expanded)
	Relative Proportions : (follow Roman square capital proportions, regular general width, monospaced)
	Relative Internal Proportions : (ascender to cap height, x-height, small x-height)
Modelling This attribute classifies the weight, and variety of line used within the form.	Contrast : relative difference between thickest and thinnest strokes (medium, high, exaggerated)
	Axis of Contrast : indicating where the thinnest and thickest strokes are located (none, vertical, angled, horizontal)
	Transition: identifies the relation between the thick and thin parts of the letter (none, gradual, abrupt, instant)
Weight These attributes describe the thickness of forms across an entire font of characters, along with its overall color, intensity and impact	Color : when fonts are single weighted, we refer to colors which are (light, medium, dark)

Terminals Stroke endings are found on several letterforms, these terminals differ in their location and application	Baseline Terminals : Handwritten (beak stroke, hooked stroke, oblique, rectangular, serif), Serifs (blunt, sharp, line serif), Others (slab serif, bracketed, vestigial)
	Ascender Terminals: (plain, tapered,blunt, softened teardrop)
	Upper Terminals: (oblique, symmetrical, and splayed
Key Characters Some characracters are treated significantly to be distinguished within font characters.	Single or double story (eg. the letter a), oblique or horizontal cross bar (eg. the letter e), sitting on or descending below baseline (eg. the letter f), flat line, pointed or concave apex (eg. the letter A) short tail, tail dissecting bowl, long tail (eg. the letter Q)
Decorations Detailing some motifs and treatments on already existing letterforms	(inline, outline, shadow, reversed out, shaded, stencil, decorated or pictorial)

C.4.1 SOURCES & PATTERNS

Sources	Pattern
Handwritten	Bastarda (generic broken script)
	Textura
	Humanist
	Rotunda
	Schawbacher
	Italic: Chancery Hands
	Fraktur
	Italic Old Face
	Civilité
	Italic into italian hand
	Italic
	Roundhand
	Informality into everyman
Roman	Humanist
	Roman
	Aldine Roman
	Dutch Taste
	Continental Taste: early
	British Taste: early
	Continental Taste: late
	Old Style

19th century vernacular	Fatface
	Tuscan
	Clarendon
	Iconic
	San-Serif: Grotesque
	Slab-Serif: Egyptian
	Italian and French Antique
	Grecian 1 and 2
	Latin and Runic
Decorated/ Pictorial	Decorated/ Pictorial (embellishing)
	Decorated/Pictorial (encompassing)
Additional	Grecian 3
	Curvilinear

C.5.FONT SOURCES CLASSIFICATIONS

C.5.1 ADOBE FONTS

Categories	Attributes	Arabic Script Applicability
Classification: This attribute defines structural properties that the set of characters in single font share, this includes:	Sans Serif	Since Arabic letterforms do not have serifs, most of the fonts are listed under this structural property
	Serif	Letterforms in Arabic do not deal with serifs, but one Naskh Script was categories
	Slab Serif	Not applicable : Letterforms in Arabic do not deal with serifs
	Script	Not applicable : Font diversity does not offer script origin fonts
	Blackletter	Not applicable : Black lettering was not practiced on Arabic writing system
	Mono	Not applicable : Arabic letterforms are curved by nature, therefore monolinear structures do not exist
	Hand	Not applicable : Font diversity does not offer handwritten origin fonts
	Decorative	Not applicable : Font diversity does not offer decorative fonts
Recommendation: This attribute refers to the use of the font, on where and how it can be used, the user can select an option, or view both options.	Paragraphs	Filter un-applicable
	Headings	Filter un-applicable
Properties: This attribute defines appearance properties that are related to letterform proportions, and stroke characteristics	Weight (light, medium, bold)	Applicable
	Width (narrow, medium,wide	Applicable
	X-height (low, moderate, high)	Not applicable : Arabic deal with different anatomic guidelines, x-height is not one of them
	Contrast (low, moderate, high)	Applicable
	Standard or Caps only	Not applicable : Arabic alphabets do not have lower and upper cases
	Default Figure Style	Not applicable

C.5.2 GOOGLE FONTS

Classification Elements	Attributes	Arabic Script Applicability
Categories: This attribute defines structural properties that the set of characters in single font share, this includes:	Serif	Letterforms in Arabic do not deal with serifs, but one Naskh Script was categories
	San Serif	Since Arabic letterforms do not have serifs, most of the fonts are listed under this structural property
	Display	Font diversity covers Display font
	Handwriting	Font diversity covers handwritten fonts
	Monospace	Not applicable: Arabic letterforms are curved by nature, therefore monolinear structures do not exist

Language:
This attribute allows the user to locate their intended fonts that only cover a certain language and script. Google Fonts cover over 28-languages which include (Latin, Arabic, Thair, Chinese, .. etc)

Classification Elements	Attributes	Arabic Script Applicability
Font Properties: This attribute defines appearance properties that are related to letterform proportions, and stroke characteristics	Number of Styles (weight variations of font) – up to 17 styles	Applicable
	Thickness (stroke thickness)	Applicable
	Slant	Applicable
	Width	Applicable

C.5.3 29LT

Classification Elements	Attributes	Arabic Script Applicability
Category This attribute defines structural properties that the set of characters in single font share, this includes:	Sans Serif	Letterforms in Arabic do not deal with serif
	Serif	Letterforms in Arabic do not deal with serif
	Slab Serif	Not applicable : Letterforms in Arabic do not deal with serifs
	Script	Not applicable : Font diversity does not offer script origin fonts
	Geometric	Applicable
	Humanist	Applicable
	Cursive	Applicable
	Freehand	Applicable
Proportions: This attribute identifies properties related to letter dimensions, and their relation with the space around it	Width (monospaced, condensed, semi-condensed, normal, semi-wide, wide)	Applicable
	Contrast (monolinear, low contrast, high contrast)	Applicable

Style:

This attribute identifies the overall look a font has, and the effect it gives to the perceiver. Style could be helpful when choosing a context-related font. Options include (clean, classic, corporate, experimental, economic, graceful, informal)

Use:

This attribute refers to "how" the font will be used, as in function, which is also related and dependent on the form classifications. Use attributes include (display, titles, body text, small text)

Format:

This attribute refers to "where" the font will be used, as in context. Which correlates with both form classifications and the Use attribute. Format attributes include (advertising, branding, infographic,publication,screen platforms, and wayfinding)

APPENDIX D: CLASSIFYING FONTS INTO ATTRIBUTES

D.1 CLASSIFYING AL-AQLAM-AL-SITTA

Classifications		Attributes	Kufic Script	Thuluth Script	Naskh Script	Reqqa Script	Diwani Script	Naskh-ta'liq Script
Classification 01								
Construction & Usage		Source of Emergence (Calligraphic, Latin, Freehand)	calligraphic, Musnad script	calligraphic, Kufic, & other scripts	calligraphic, Kufic, & Thuluth	calligraphic	calligraphic	calligraphic, Thuluth & Naskh
		Context of Use (Display, Titles, Body text, Small text)	body text (Quraan), display today	titles & displays	titles, and body	headings & titles	headings, ottoman connoted	titles, and body (romantic poetry)
		Format of Use (Advertising, Branding, Signage, On screen platforms)	branding	branding, signage, on screen	branding, signage, advertising	branding & advertising	branding	branding
Classification 02	Structural Details	Character Complexity	moderate	high	moderate	low	high	low
Anatomic Attributes		Character Differentiation	low	high	high	moderate	low	low
		Closed Shapes	none	"meem"	none	"meem" "ghain" "ain"	"meem" "ain" "waaw"	"meem" "ghain" "ain"
		Bowl Form	angular	curved	circular	curved	circular	curved & depressed
		Letter Clarity	moderate	moderate	high	low	moderate	low
		Kashida Usage	applicable	applicable	applicable	not applicable	applicable	not applicable
	Weight & Stroke Attributes	Stroke Thickness	high	low	moderate	high	low	moderate
		Stroke Contrast	low	high	moderate	low	moderate	moderate to low
		Stroke Beginning	horizontal	diagonal 1/3 nib head	diagonal	diagonal	serif-like pointed	pointed
		Stroke Ending	horizontal or pointed	pointed of diagonal	pointed	pointed	pointed	pointed
		Dot Shape	cicular, or angular	rhombus	rhombus	rhombus & swashes	swashes	rhombus & swashes
	Vertical & Proportional Guidelines	Guideline Fluidity	low	high	moderate to low	high	high	high
		Ascender Height	long	long	moderate	short	moderate to high	moderate
		Descender Height	short	moderate	moderate	short	moderate to low	moderate
		Tooth Height	long	moderate	moderate	short	moderate to low	moderate
		Dots & Diacritics Fluidity	moderate	high	low	high	not applicable	not applicable
	Range of Characters	Glyph Variability	low	high	high	high	high	high
		Dots Variability	low / language dependent	low / language dependent	low / language dependent	low / language dependent	high	high / language dependent
		Diacritic Variability	high / decoration dependent	high / decoration dependent	low / language dependent	not always used / decoration dependent	not applicable	not applicable
		Ligature Variability	only decorative	only decorative	moderate	high	only decorative	high
Classification 03	Hand Movement Attributes	Slant	not always	slanted verticals	hand angle dependent	hand angle dependent	heavy curves	diagonal slant
Connectivity & Harmony		Writing Speed	slow	low	high	high	slow	moderate
		Cursivity	moderate	high	moderate	high	moderate	moderate
		Axis of Contrast	0 degrees	inclined	hand angle dependent	hand angle dependent	bi-directional	inclined

D.2 CLASSIFYING OPEN SOURCE TYPEFACES

Typefaces included (Gebran, and Arabic Zapfino; designed by Nadine Chahine), (Azal by 29LT), (Vibes by AbdElmomen Kadhim) , (Aref Ruqqa by Abdullah Aref, Khaled Hosny, Hermann Zapf) and (Khayal by Mostafa El Abasiry).

Classifications	Attributes	Gebran	Zapfino	Azal	Aref Ruqqa	Vibes	Khayal
Classification 01 — **Construction & Usage**	Source of Emergence (Calligraphic, Latin, Freehand)	calligraphic, simplified Naskh	calligraphic, hybrid of Naskh & Naskh-ta'liq	hybrid Kufic, & freehand	calligraphic, Reqqa	freehand	freehand
	Context of Use (Display, Titles, Body text, Small text)	headlines & titles	display, titles, and text	display & titles	display & titles	display & titles	display & titles
	Format of Use (Advertising, Branding, Signage, On screen platfroms)	newspapers & editorials	advertising, branding	advertising, branding & screen platforms	branding & advertisment	brading & advertisment	branding & advertismesnt
Classification 02 — **Anatomic Attributes**	*Structural Details* — Character Complexity	moderate	moderate	high	moderate	low	low
	Character Differentiation	high	high	low	low	low	low
	Closed Shapes	"ain" "ghain"	none	none	"faa" "qaaf" "meem"	none	none
	Bowl Form	circular	curved	angular	curved and depressed	circular	circular
	Letter Clarity	moderate	moderate	low	moderate	low	low
	Kashida Usage	applicable	applicable	applicable	not applicable	not applicable	not applicable
	Weight & Stroke Attributes — Stroke Thickness	high	low	high	high	low	low
	Stroke Contrast	moderate	high	high	low	low	low
	Stroke Beginning	diagonal	diagonal	diagonal	diagonal	horizontal	rounded
	Stroke Ending	pointed	pointed	diagonal	diagonal	horizontal	rounded
	Dot Shape	rhombus	rhombus	circle	rhombus & swashes	circle	circular, & angular
	Vertical & Proportional Guidelines — Guideline Fluidity	low	moderate	low	high	moderate	low
	Ascender Height	moderate	high	moderate	short	long	long
	Descender Height	moderate	high	modertate	short	short	long
	Tooth Height	moderate	moderate	moderate	short	long	short
	Dots & Diacritics Fluidity	low	high	high	high	high	high
	Range of Characters — Glyph Variability	low	high	high	high	high	high
	Dots Variability	low - only Arabic	low - only Arabic	high	low - only Arabic	moderate	moderate
	Diacritic Variability	low - only Arabic	low - only Arabic	high	low - only Arabic	moderate	not applicable
	Ligature Variability	moderate	moderate	moderate	high	low	moderate
Classification 03 — **Connectivity & Harmony**	*Hand Movement Attributes* — Slant	according to nib head	backward slanted	diagonal slanted	none	none	none
	Writing Speed	fast	fast	slow	fast	fast	fast
	Cursivity	moderate	moderate	moderate	high	high	high
	Axis of Contrast	inclined	inclined	0 degrees	horizontal	0 degrees	0 degrees

APPENDIX E : REQQA-SCRIPT CLASSIFICATORY ATTRIBUTES

font name: Aref Ruqaa
font source: google fonts

CLASSIFICATION 01

CONSTRUCTION & USAGE

Refers to the overall structural property of the letterforms.Which includes the source of the typeface the context of which it is used in, and the format.

Source of Emergence
Calligraphic
(from Ruqaa script)

Context of Use
Display and Titles

Format of Use
Branding & Advertisment

CLASSIFICATION 02

ANATOMIC ATTRIBUTES

This class refers to the anatomy of the typeface, which includes *(structural details, thickness , guidelines, and character range)*

Structural Details

-Character Complexity : low, since it is a fast written script.

-Character Differentiation: moderate, example shows letters (ف،ق), not only differentiated by dots, but also by structure.
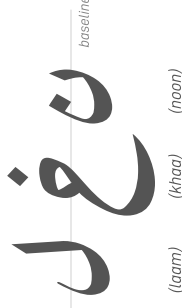
-Dots Relativity & Shape: dots are proportional to letter size, shapes vary *(single dot : rhombus, double dots : swash, and triple dots: curved swash).*

(triple) *(double)* *(single)*

-Closed Shapes: *exist in all glyphs of (ف ،ق ،م), and only medial and ending glyphs of (ع،غ)*

(medial & ending ain) *(waaw)* *(meem)*

-Bowl Form : curved bowl form, found under the baseline.

(laam) *(khaa)* *(noon)* *baseline*

-Letter Clarity and Legibility: moderate, to low. Ruqaa is a fast written script, documentation is more important than legibility.

-Kashida Usage : *not used*

Weight & Stroke Attributes

-Stroke Thickness: thick stroked script

-Stroke Contrast: moderate contrast between thickest and thinnest point.

-Stroke Beginning & Ending : Beginning is diagonally trimmed. Ending is either diagonally trimmed or pointed.

Vertical & Proportional Guidelines

-Guideline Fluidity: high

baseline fluidity: high, with thick horizontals.

dots & diacritics position fluidity: high, multiple positions.
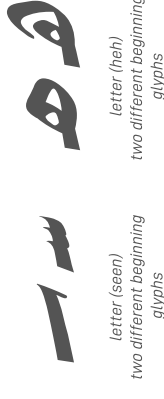
stem height variability: high

ascender length: short, & dynamic

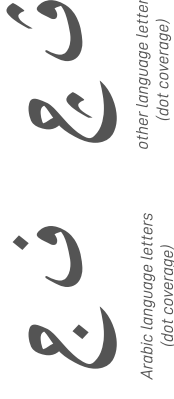*descender length:short, & dynamic*

tooth height: short, & dynamic

Range of Characters

Glyphs (Character Variability): moderate, to achieve different word forms.

letter (seen)
two different beginning glyphs

letter (heh)
two different beginning glyphs

Dots Variability: high, covers Arabic Language, and other languages.

Arabic language letters (dot coverage)

other language letters (dot coverage)

Diacritic Variability: low, covers Arabic Language only.

Ligature Variability: moderate

Numeral & Symbols: Hindi Numbers, & basic symbols.

CLASSIFICATION 03

CONNECTIVITY & HARMONY

This class refers to the effect of handwriting on the script,which includes slants, axis of stroke contrast, and writing speed and cursivity.

Hand Movement Attributes

-Slant: *none*

-Axis of Contrast: *horizontal*

-Writing Speed: *high*

-Cursivity: *high*